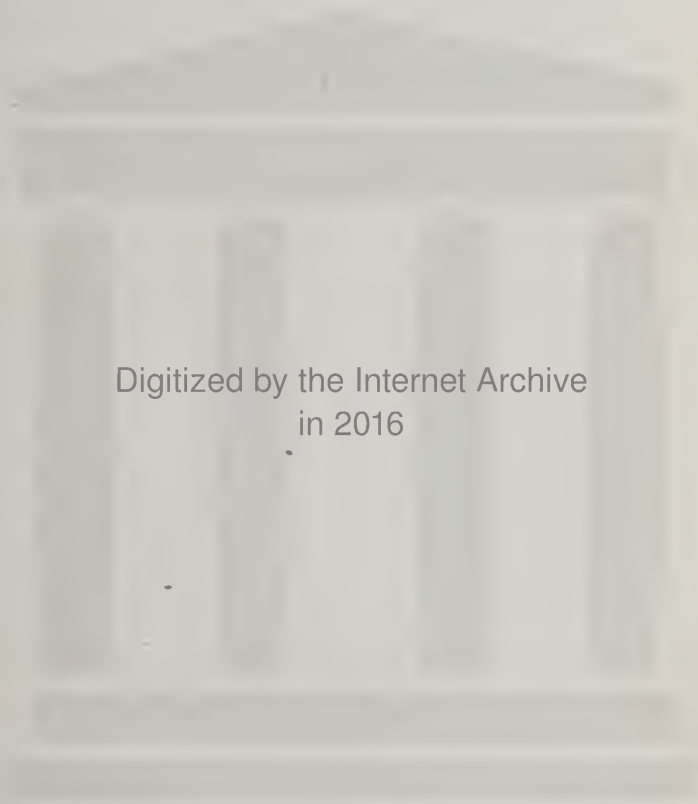

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NEW SERIES.

"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of Asia will commit their observations to writing, and send them to the Asiatic Society, in Calcutta; it will languish if such communications shall be long intermitted; and will die away if they shall entirely cease."—SIR WM. JONES.

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JOURNAL

OF THE

ASIATIC SOCIETY.

Notes on the Pokree and Dhanpoor Copper Mines in Gherwal. By SIEGMUND RECKENDORF, ESQ., *Mining Engineer.*

After the commissioner, Mr. Lushington's report, Vol. XII. Journ. As. Soc. 1843, little remains to be said about the situation of these mines. Pokree is on the right, Dhanpoor on the left side of the Douliganga, both about six miles horizontal distance from the river, and twelve miles between themselves. From Pokree I saw Dhanpoor distinctly, and it appeared about 1,000 to 1,500 feet higher situated. Putting the compass in h. 17 or hs. (15° E. to S. or 15° W. to N.) I had on the bearing—therefore in one line—on one side the Rajah's mine, and (according to the statement of the people,) several places where the same talcose slate occurs as in the Pokree mine. On the other side, I had a place, called Deehoor, on the road to the valley of the Gunga; and on the Dhanpoor side a place little below the village, both places containing the slate. The layer of talcose slate containing the copper ore is therefore a very extensive one, and there is every reason to believe, that the copper goes as far as the slate, and the slate as far as the formation, to which I consider the slate to belong. Indeed it requires very little attention from an eye, practised in researches after minerals, to see that the whole of the known copper mines from the Nepal teraee in the east, till beyond the Pokree mine in the west, are only parts of one layer of not very great thickness, which perhaps may have been subdivided in two or three thinner layers, by some other oreless layers of slate or limestone

now transformed into Dolomite. In a country where mining is more in use and better known than in India, lakhs of rupees would have been spent upon feebler indications of ores than are here seen. When I was at Pokree there was no work going on, but two or three native women washing old heaps of nearly exhausted rubbish. The "Khans" were nearly entirely broken down—that in which Mr. Wilkin put in timber, was yet open for about forty yards, but in all these very slight indications of ore, copper pyrites and blue and green carbonate. Since many hundreds or thousands of years that part of the layer has been alternately exposed to the access of air and water, and accordingly the copper pyrites has been transformed into sulphate of copper, which is dissolved and carried off by water. That process is going on still, the waters containing enough sulphate of copper to cause, by aid of Hanuman or some other old gentleman, the great wonder of metamorphizing—*i. e.* covering —iron nails, thrown into the water with copper. The natives showed me two of these nails as perfect miracles.

It was in this part of the layer where not only the native rulers worked, but also Mr. Wilkin. The slate in it is soft like soap, and very little ore remained, partly as pyrites, partly in sulphate, partly as blue or green carbonate of copper. From Mr. Wilkin's bad success no conclusions ought to be made, or can be made. An experiment on ore from Chili or Kamtschatka would be as decisive for the riches of Pokree mine as Mr. Wilkin's was, and when I heard that a "*sahablok*" worked $2\frac{1}{2}$ years at Pokree I could scarcely believe it. But I admired Mr. Wilkin's proceedings, when I saw, from Mr. Lushington's report, the means Mr. Wilkin had at his disposal, and the object of his labour. I then acquitted Mr. Wilkin of every fault of which I had accused him in my mind when I saw that, with a sum scarcely sufficient to open the spot where the ore can be hoped for and collect materials for buildings, he had to decide upon the riches of *a mine at first to be created*. The layer dips in h. 23 (15° N. to E.). The work to be commenced was, a gallery 30 or 40 fathoms below the old mines; and not the excavation of ores which are a very good addition in smelting better ones, but the smelting of which never would pay. If left to his own judgment, and having the whole sum at disposition, Mr. Wilkin probably would not have produced any ore in the first year and a half, at the end of which he would most probably have been able to show such

specimens of ore as would extinguish every doubt on the richness of the mine; then, and not before then, was the time to begin experiments; but also these ought to have been made in another way. Mr. Wilkin could not prepare the ore on hearths and with sieves, as undoubtedly he would have done, had there been more money at his command. Furnaces on a scientific system instead of the rough native hearths ought to be made, and these with powerful bellows put in regular motion by water-wheels instead of two goat skins moved by hand. In such fire-hearths, I saw in Dhanpoor two meltings, each continued through about four hours, and from beginning to end the flames (4 to 5 feet high, and 3 to 5 feet diameter) were perfectly green from loss of metal. The natives told me that such was the case in Pokree also! This shows that,

1. The necessary preparations before the smelting could not be made.

2. That the smelting was not properly conducted, the loss being too great.*

3. That the ore used was not the ore which would be the object of mining on a large scale, it being impoverished by the slow metamorphosis of pyrites into sulphate of copper.

It must be confessed, that the Pokree mines are highly wronged by the conclusions made from results shown by any work done till now. It could be objected against p. 3, that the presence of better ore or richer ore, is only a supposition; but it is not so! I found in the Pokree bungalow a piece of hard rock talcose slate—with a high coloured pyrites of copper, taken *from the end* of Mr. Wilkin's "Khan." The ore was from a place where either no water came, or where it stood constantly; but all the pyrites *from the first* 30 *or* 40 *yards* had—so said the natives—a greyish-watery colour. This shows that ore in the bowels of the mountain is better preserved than on, or near the outside; consequently more ore must be there, for it cannot be supposed that an ore which for so many miles continues, and has so little thickness, should not go, with the layer in which it occurs, to a considerable depth at least. Analogy with thousands of cases leads to the supposi-

* In a high furnace a large quantity of metal offers a nearly as little surface to the wind as a small one. In a high furnace the ore is only exposed to the stream of wind at the moment of melting, but in a hearth both ore and metal are constantly exposed.

tion mentioned, that in Pokree and its neighbourhood vast quantities of copper could, with advantage, be produced. And upon observation of analogies and anomalies in nature, hundreds of valuable rules are founded, and most of sciences based.

Assisted by these rules *mining is no lottery*, and not more hazardous than agriculture and manufactures.

I come now to other objections made to these mines,—1. The distance from Pokree to Almorah is *perhaps* one day's march farther than Almorah from the plains, to a point where several days' land-carriage for the metal from the river is required. Sreenugur is yet nearer than Almorah, and even Hurdwar can easily be reached from Sreenugur, by little flat boats steered by one man, loaded with a sufficient quantity of metal. The boats should be of a light construction, and would *as wood only* sell very well.—2. Articles of bulk are, for the beginning, not required, and should mining *become modern* in the Himmalayas, roads (which however in these parts are not so very bad, as not to be passable, after very little repair, by mules, horses, and even by elephants,) will soon be made; and in a later period larger articles certainly will be manufactured *in the hills*. Iron ore is plentiful there.

3.—The English copper is cheaper, because it is worse than the native copper. The natives in Sreenugur, Teeree, Hurdwar, etc., told me, they would not use the English wrought copper, but for the great size of the plates. For smaller work they prefer Dhanpoor copper. If the lessee had any difficulty in selling the metal at two rupees, he could easily give it cheaper; but his stores are always so small, that he is sure to sell even at the higher price. From cross-examination of his mookteear, and the miners and smelters, I calculated his profits at thirty per cent., and from the unwillingness of the first to tell me more, I had reason to think that my calculation was right. I told him so, and the result of my reckoning, and how I obtained the data without the reporter's knowing it. When I had left Dhanpoor, my servant told me that the mookteear abused the work people for their betraying him, and the people were quite astonished to hear they had done so. The Commissioner, Mr. Lushington, states the way in which the charcoal burners are going on. They will cease to do this if they hear that from the trees themselves better charcoal can be obtained than from the mere branches, and should they continue the work, nothing remains for the lessee but to send

his own coal-burners *for working up such wood as remained from the other burners,* saving thus the outlay for cutting down the trees. The lessee would have always charcoal enough, even for a large establishment, or several of them, for if the inhabitants see they can obtain a constant livelihood they will take care not to waste wood. Provision however for the renewal of the forest must always be made for the sake of future cheapness. I think too labor could be obtained cheaper than in England, even if the greater skill and bodily strength and good-will of European workmen is taken in account. The old smelter in Dhanpoor may be compared with the most skilful smelters any where. I believe now to have shown the possibility (and probability) of turning to advantage the riches of Pokree; the copper could support the concurrence of the English copper in the lower hills and part of the plains, and would have advantages over it, in the higher interior, and in such places at the foot of the hills where the English product cannot reach by mere water carriage.

The Dhanpoor mines, or holes, are worked to advantage, and no doubt could be made more so; but perhaps it would take more trouble to find the layer of copper than in Pokree. What till now is opened would under European superintendence be entirely exhausted in the course of one year or two. It is possible the layer may turn out to be a regular dyke, but I suppose it will not be so, but might be cut off by slate at no very great depth. The working on a large scale would be also more expensive in Dhanpoor than in Pokree, for the ore must be stamped, and washed on *moving hearths.* However, I will not say, that Dhanpoor mine could not be made, by continued labor, a very rich one. The situation of Dobri mine on the other side of the very same hill range, admits no doubt of the ore's extension; moreover the steepness of Dhanpoor hill admits shorter galleries and to greater depth. The present mine could not of course be of any use. There are galleries of several fathoms in height and breadth, following upon and preceded by others, which are so low and narrwo, as to admit only children; and the slope goes downwards, then up again for a few yards, now to the right, then to the left; &c. A shaft in the mine is only passable for those who do not mind going about in the dress of Adam on the first day of creation, for only the adhesion of the skin to the nearly

polished rock, keeps the passenger in many places from falling down. The tools are only a chisel and a hammer ; blasting of course ought to be introduced.

From what is above said, it will appear as my conviction, that in the copper mines of Pokree and Dhanpoor, capital could most advantageously be employed. But it is not Government, in my opinion, who should work there. The best writers on national economy agree, that such speculations do not thrive in the hands of a Government. If Government would give these mines to any private individual or company, for as long a period as they pay regularly a certain duty from the produce, and would allow to any one else to begin mining wherever he could find an ore, in a very short time, certainly, many places where ore is known, would be taken up, and the revenues of Government, now derived from the mines, would be very considerably increased. Districts, now nearly empty of population, void of cultivation, useless to the treasury, would yield revenue, and the population would become acquainted not alone with European luxury, but with European skill and intelligence, which would be at first more useful than schools and missionary establishments. As the agriculturist prepares by ploughing the hard soil for the reception of the seed, so we may consider, the becoming acquainted with the advanced state of European arts would " plough" the *Paharri's* mind for the acceptance of higher objects, which they might be thought fit for being taught in some future time.

And did not nature show her intention of civilizing the inhabitants of these wild districts through mining, by her upheaving such mineral riches which, in their present state of civilization, they cannot appreciate ?

With regard to the capital required for the opening of Pokree mine and Dhanpoor mine, I think 40 to 50,000 rupees would be more than sufficient for both establishments, on a footing equal to the advantages which can be expected in the first result of an operation, which may be carried on through hundreds of years.

Calcutta, September, 1845.

Report of an Expedition into the Mishmee Hills to the north-east of Sudyah. By Lieutenant E. A. Rowlatt, 21*st Regt. N. I. In a letter to Major* F. Jenkins, *Governor General's Agent, N. E. Frontier, dated Saikwah,* 1*st January* 1845. *Communicated by the Government of India.*

I now do myself the pleasure of forwarding to you an account of the expedition from which I have just returned, and at the same time beg to submit a map of the country through which I passed, to this I have added some portion of the country more to the north than to where I penetrated, and which is therefore merely laid down from descriptions gathered from the Mishmees who have visited those parts.

On Thursday, the 21st of November last, I quitted the port of Saikwah by water, and on the following day being joined by two Sudyah Beekhyahs, Deena Hazaree and Baleah Boca, who were to accompany me during the trip. At the mouth of the Koondil river, where I had remained the night, we took our final departure, myself in a small khail boat, and the rest of my party in the small fishing boats of the country, which, for the sake of ascending the rapids of the Burhampooter, are made particularly light and handy.

As it was our first day, we were not able to start very early; and I found that the evening was drawing to a close before we had long passed the mouth of the Tainga-panee. Up to this point the stream continues pretty tranquil, although a perceptible difference is observable in the rate at which it flows; and as from this point upwards the banks and islands are almost entirely formed of stones* washed down from the mountains, the water from hence is most beautifully clear and transparent.

Nov. 23*rd.*—In pursuance with the directions I had given the previous evening, the boats moved off by sunrise, and by 9 A.M. we reached the Khamptee village of the Kaptan Gohain at Choonpoora, where I stopped for a short time, and again moving forward, arrived by the evening within a short distance of the mouth of the Dhollee river, which I got to early the next morning. Being anxious to see a copper Tem-

* These pebbles and boulders are all of limestone, and furnish all the lime used in the public works in Upper Assam. The limestone is a grey crystalirized rock just exactly the same as the marble used as flags in the Government House. I have never seen it in sitû.—F. J.

ple that is situated on a branch of this stream called the Sutrung, I ascended the river in the smaller boats, and finding that the water in the Sutrung was only a few inches deep, I was obliged to wade up this stream; but from the jungle having become excessively dense, and having no person with me who knew exactly the position of the Temple, I was obliged to give up the attempt and return to the mouth of the river, unsuccessful and disappointed.

The erection of this building is ascribed to a demi-god, named Purahoutan, who, falling in love with the goddess Khaisa Kattee, undertook at her commands to build her a temple in the space of one night, which if he succeeded in completing he was to obtain her hand in marriage, but failing in his task was to give himself up to be devoured by her. On these terms, Purahoutan commenced his undertaking, and had completed the Temple with the exception of the doors, when the sun being made to rise before its time he was obliged to fly to the woods; but, being soon after overtaken by his beloved, was then and there devoured as a morning repast.

The Temple* is called the Tama-suree, being partly made of copper; and at so late a period as a little upwards of twenty years ago, two human beings were sacrificed yearly at her shrine to propitiate the good auspices of this sanguinary goddess. Near the mouth of the Dhollee are yet visible the remains of the residence of the Chutteeah Rajas, whose rule is said to have extended over the whole valley of Assam as far as Gowalpara, but which was terminated by the invasion of the Ahoms, who crossed the hills from Moonkong.

Nov. 25th.—As we had now fairly got into the rapids of the Burhampooter, where it was necessary for the boatmen to be constantly in the water, I stopped to cook before setting off, as the weather being cold the men did not like wading, until they had fortified themselves with some food. I managed, however, to get off by 8 o'clock, and before midday had passed the mouths of the Khairam and Degoroo rivers. The banks of the Burhampooter are here principally wooded with the

* A remnant of the priests of this Temple, who call themselves Dolyes, have lately come to Lieut. Dalton's notice at Luckimpoor. They are of Chooteeah origin: they boast of the human sacrifices, and say the discontinuance of them has been the cause of all the misfortunes of Assam. Lieut. Dalton promises some particulars of these Chooteeahs, the last great race who held possession of the north bank of Upper Assam at an early date.—F. J.

Sissoo tree, intermixed with Hallecks which, from the beautiful red flower that blossoms on it at this time of year, imparts quite an autumnal tint to the landscape.

This day the patches of cultivation in the hills became quite apparent, and the landslips on some of the mountains appeared of such magnitude that the fact of a village being occasionally swept away ought not to be wondered at, and I was told that the village of Macrusu was so destroyed last year, and that many of its inhabitants together with the chief of the village were involved in the destruction. By evening we arrived at the mouth of the Sidroo, where we remained the night.

Nov. 26th.—From this point the river becomes a succession of rapids, so that during the day our progress was but slow. The scenery is, however, very magnificent, and the river abounds with a great variety of the best sorts of fish, amongst which I mention the Silghurreah, Boca, Maikhan, Liun, Sandoees, Advee, &c. &c., which when fresh caught are most delicious eating.

At the foot of one of the hills that approaches the Burhampooter at this part, is observable a high white cliff, which the traditions of the natives affirm to be the remains of the marriage feast of Raja Sisopal with the daughter of a neighbouring king, named Bhismak; but she (Rookmunee) being stolen away by Krishna before the ceremony was completed, the whole of the viands were left uneaten, and have since become consolidated into their present form.

As we had now arrived within a short distance of the Kbamptee village inhabited by the sons of the Rannah and Jow Gohains, I sent in some of my people to inform them of my arrival, and in the mean time made as much progress in the boats as the nature of the stream would allow, but found that the current was too rapid to admit of my reaching the mouth of the Dura river; a short distance from which I therefore remained for the night.

November 27th.—About 10 o'clock this morning, the party I had despatched to give information of my arrival made their appearance, bringing with them the sons of the Rannah and Jow Gohains, together with several Mishmee chiefs, and a numerous train of followers both Khamptee and Mishmee, when all were assembled and a conference took place. It was arranged, that I should proceed into the hills guided by these Khamptee chiefs, who appearing to possess a good deal of

influence over these Mishmees, I was glad to accept of their escort. I therefore left my boats, and after passing over three or four miles of pebbly beach that lines the banks of the Burhampooter (or Lohit as it is usually called by the people in this part), I reached the road which, leading through the jungle that intervenes between the river and the hills, ascended up to the village which is situated a short distance up the acclivity on a level piece of ground well adapted for such a purpose. The village of these Khamptees consists of fifteen houses, and is placed on a spot of ground that some years ago was the site occupied by the Mishmees, who then called it Maboling, and is watered by a small hill stream named the Toolooah. Their cultivation, which is rather extensive, is scattered around the village, both on the side of the hill and in the plain beneath. This position has now been occupied by these people for the last three years, and in consequence of the protection they afford to the Mishmee tribes in this quarter from the inroads of the Chullee Cuttia and Myjoo Mishmees, a great many of the more influential chiefs, amongst whom I may more particularly mention Prum Song, the head of the Muroo tribe, have settled in their neighbourhood which, being much more productive than the hills in the interior and nearer to the plains, with which they are anxious to extend their trade, they find it much to their advantage to cultivate the goodwill of these Khamptee chiefs; for, should these Khamptees remove from this place, the whole of the Mishmees who have settled in their vicinity must again flee to the sterile mountains beyond the river Tiding, and forego all the advantages of trade, which from their proximity to Assam they are at present enabled to prosecute with considerable gain to themselves. During my stay in this village I ascertained the height at which the Burhampooter issues from the hills, to be 2049 feet above the level of the sea.

By the 3rd December all arrangements having been completed, and the necessary number of people collected to carry the baggage, I left the Khamptee village, and again passing down the descent entered on the stony beds of the Burhampooter; over these we passed for some miles, and found the passage along them any thing but pleasant walking. On arriving at the mouth of the Damai river we ascended that stream, and by evening had reached the path that leads up the first range of mountains. On producing my store of beads, salt, &c., I found that half a

rupee's worth of these articles was demanded for every day's work, and as I could not have proceeded without the assistance of the Mishmees, I was obliged to agree to their very exorbitant demands.

On the morning of the 4th, after a hasty meal had been despatched, and the several loads adjusted, we quitted the spot we had occupied during the night, and for some time ascended and descended the small hills that line the banks of the Damai. After an hour or two we arrived at the foot of the large range that bounds the view from the plains; the ascent was rather abrupt, and the path but a bare track up the face of the mountain. By midday we reached a small level piece of ground, where a little water was procurable; and as the mountain air seemed to sharpen our appetites, a few eatables that we had with us were devoured with great gusto.

By 4 P.M. we reached the summit, from which a splendid view of the plains and the surrounding hills is visible: on the right are seen the towering mass of immense mountains that form the country of the Myjoo Mishmees; and in the plain beneath, the prospect is only bounded by the far distant horizon, within whose limits the endless sea of forest that characterises this part of Assam is the only object that meets the eye. From this point we again descended for a couple of hours, and as the evening was drawing to a close, arrived at a small hill rivulet where, as water is the principal requisite to be sought for in a place for encamping, I determined to spend the night, although nothing but the stony bed of the stream was available to rest on. The weather being cold we found our night's repose rather uncomfortable, and were glad when the morning broke to arise and set about procuring some breakfast: this being soon accomplished we again set out, but found the road worse than the previous day, as it led over numerous landslips that in this part are met with on every slope; part was therefore over broken ground, and every now and then we had to pass onward by means of single trees that had accidentally fallen across the chasms that intersected the path. As the greater part of this day's march was descending the mountain we had ascended the day before, and the road improving as we advanced, by 12 o'clock we entered on the scattered cultivation of Saloomgoom, from which the Burhampooter is distinctly visible winding its tortuous way around the foot of the hills beneath. As we approached the village, here and there the houses of the Mishmees became apparent, and as

it is the custom of these people to build separately on the land they cultivate, a village is spread over a large space, although confined to a few habitations. On reaching the house of the Gam Abasong, I found that the whole of his people were employed in making preparations for the reception of myself and party, and doing all they could to make us welcome.

By 10 A.M. of the 6th we left this village, and there being a scarcity of people to carry the baggage, I here deposited every thing that it was possible to dispense with: after passing some cultivation the road led down by a steep descent to the banks of the Tiding river; some distance up this stream a large number of Mishmees, principally of the Malo and Moree clans, are located, who cannot be reckoned at less than a thousand persons. As the river was low, we crossed over by means of the fishing weirs, which extend across the stream; but the usual method adopted by the Mishmees themselves, is by fixing a hoop of cane round the waist, which, passing over a single rope of the same material stretched from bank to bank, enables them to propel themselves forward with their hands and feet, and whatever articles they may have with them are suspended to the bottom of the hoop: in a similar manner both cows and buffaloes are conveyed from bank to bank, being dragged over by other ropes attached to the hoops in which they are carried.

In the bed of this river are to be found a great variety of the different primitive rocks: lime is here met with in immense blocks, and granite, serpentine, &c. with numerous metalliferous stones, are mixed together in the greatest profusion. On leaving the bed of the Tiding, the road leads over the spurs of the mountains that continue down to the banks of the Burhampooter, and for some distance passes under the perpendicular cliffs of primitive limestone, from which are visible the pendulous stalactites that are peculiar to this formation; after passing the limits occupied by this rock the soil becomes micacious, and in a few places I observed mica slate to cross out from the surface. Arriving on the banks of the Burhampooter, the only path was from block to block, which being of great size and worn to a smooth surface from the action of the water, the passage over them was thereby rendered both arduous and difficult.

The mountains in this neighbourhood are mostly covered with dense tree jungle, of great magnitude, for about two-thirds of their height, above which is grass, and near the summits bare rock; and in the dells

between the mountains, small hill streams, of beautifully clear water, flow along the hollows until lost in the large rivers that intersect the country. By sunset we reached a Mishmee house, and were glad to avail ourselves of the shelter offered.

Dec. 7th.—As rain had continued falling during the night and the greater part of the day, I was unable to proceed further than a few miles; but contrived to reach the house of a chief, named Heasong, to whose residence most of my baggage had been taken on by mistake the previous day.

Dec. 8th.—On leaving this place, and passing through much low jungle where formerly cultivation had been very extensive, we reached the Looloooah rivulet, and crossing which the road lay skirting the banks of the Burhampooter, to the bed of which we occasionally descended; for the most part the road for these hill tracks was tolerably good, except one place that ran along the side of a low rocky mountain where the footing was unsafe and precarious, from which had any one fallen, he would have been precipitated some thousand feet into the boiling stream of the Burhampooter, the noise of whose waters was just audible from the height we were passing. During this day's march we passed by an elevated lake of small extent, as well as many streams of minor size, and by 4 P.M. arrived at the house of Rumling, who is the head chief of the Taen tribe of Mishmees, and has established himself near the Pass leading from the country to the south of the Burhampooter, which being inhabited by the Myjoo Mishmees, with whom the tribes to the north of the river are at war, affords thereby a protection against the inroads of these people. As a large pig had been slain by this chief in honor of our coming, a part of which is usually reserved for the inmates of the house, I was much amused to see the manner in which these people cook and feed themselves. The animal being killed the blood is all carefully collected, and with the grain babosa is made into a kind of black pudding; the meat is boiled in a large chaldron, and being cut up into pieces is distributed in leaves amongst those in the house; these pieces being taken up in the hand are forced as far as possible into the mouth, and the remainder cut off close to the lips: when this is disposed of, the mixture of babosa and blood is stuffed down their throats as fast as they are able to swallow it. In this manner their meals are completed in a few minutes, when they

again take to their pipes, which are seldom out of their mouths from morning to night. Many of the cooking utensils used by these people are made of stone; but they also possess some of copper, which are brought over from the Lama country; in these they boil their water, cook their victuals, and make the liquor of which they consume large quantities; but as it is drunk in an unfermented state, and therefore is of little strength, a great many quarts are necessary to produce the slightest intoxication.

As I was informed by this chief that some people of the Lama country were at a village some distance further on, I determined to proceed to the place they were remaining at, and sent forward a messenger to inform them of my intention. It was therefore the morning of the 11th December before I quitted this chief's house, and after proceeding some distance we arrived at the Dillee river, which is a stream of considerable size, having its rise in the snowy range bordering the Lama country, along whose banks a path to that country exists. After crossing this river we proceeded along the verge of the Burhampooter, and by 4 P. M. reached the mouth of the Doo river, which, although a stream of some magnitude, is yet much inferior in size to the Dillee, and rises also in the same range of mountains as that river, a little more to the eastward, and is one of the routes by which the trade with the Lama people is carried on. From this point the Burhampooter has a south-easterly direction, and, winding between the mountains, passes through the snowy range beyond which the valley of Lama is situated. By the route of the Dillee river the road leads out at the village of Glee, and by the Doo at that of Lamai in whose vicinity are also many other villages of the Lama people, all of which are described as situated on the Burhampooter. The village highest up this river is named Lisko, where the Burhampooter is said to be but a mountain rivulet, and on the west side of the same mountain from which this issues likewise proceeds the Dehong river.

Dec. 12th.—After quitting our halting place we proceeded up the bed of the Doo river, over large boulders of granite and serpentine, and where from the river passing between perpendicular scarps of rock we were unable to continue along the bed; it was found necessary to ascend the banks of the river, which, as they were very precipitous, was found to be difficult to be accomplished, and in many cases extremely dangerous to

pass. By 3 o'clock our party reached a flat piece of ground overlooking the river, where it was considered advisable to remain during the night.

The several clans in the neighbourhood of this stream consist of the Manncah, Tshee, Dhah, Tummaih, and Mlee, who altogether are a numerous people, but in appearance most indigent and ill provided both in food and clothing, and are as wild a set of unwashed savages as may perhaps be met with in any part of the world.

The water of the Doo is by no means good, having a disagreeable taste, and has the property of giving goitre to all those who drink it.

Dec. 13th.—On leaving the bed of this river, the ascent up the Dagoom range of mountains is very steep, and in many places where the rain had cut the side of the mountain into deep chasms, the path could only be passed by means of trees thrown from point to point, beneath which a perpendicular scarp of rock was all the resting place that would have been found had an unlucky step or a rotten bough caused any one to fall at any of these places.

On arriving at the village of Tuppang, I and my party put up at the house of the Gam, and as the Lama people were staying at a house not far distant, during the afternoon I had an interview with them. It appeared they had come across the snowy range for the sake of trading with the Mishmees for *teeta*;* but from the snow having fallen unexpectedly, had not been able to return to their own country.

In appearance these people much resemble the Chinese, and are dressed in a loose robe that falls in folds around the waist, and are a fair and tall race of men; some wear the hair plaited in the Chinese manner down the back, while others have the head shaved; and from their description of themselves, it appears that those who trade with the Mishmees are likewise a hill tribe, and in their manner of life differ very little from the Mishmees themselves. I should however imagine, that the country they inhabit is not very rugged, as on all the cattle brought from thence I observed the marks of the plough distinctly visible on the neck†.

* *Captis teeta*, Wall.

† This agrees with a report current in Upper Assam, that during an excessive inundation of the Burhampooter, a great number of ploughs and other agricultural implements were brought down by the floods.

The Assamese suppose the country they come from to be inhabited by Kotas; of which are the Assamese themselves, as the great body of the Assamese population.—F. J.

After conversing with them for some time, I found they were prohibited by their own Government from visiting the plains of Assam, and not having been to Lassa the capital, were unable to give me any precise information regarding the Tsampoo ; but said that, according to all they had heard, the river flowed into the valley of Assam after quitting the country to the north of the mountains, and is therefore in all probability identical with the Dehong.

The view from this village is very grand, as the distance from the snowy range, which was immediately opposite, was only two days' journey to the summit, and from this point (Tuppang,) I was told by the Mishmees that they were able to reach the village of Lamai in the Lama country in three days.

As no further population is to be met with on this side of the snowy mountains, I determined to retrace my steps from this point, as no advantage could, I conceive, take place by my proceeding any further in this direction ; I therefore on the following morning again left this village, and, varying my route so as to allow of my getting a sufficient set of sights to complete my survey, I arrived again at the Khamptee village on the 22nd of December.

From hence I set out to visit the celebrated Teeruth of the Hindoos, called the Brahma Kund, which I reached, and returned from, in two days. This place I found to be merely a bay or inlet of the Burhampooter, into which falls a small stream, that issues from the side of the hill immediately above it; this is considered the holy water in which all the devotees who visit the place bathe themselves, and is reported to have the virtue of washing out all the sins that the person may have previously committed. During the time of the Ahoms, it was necessary for the king on his ascension to the throne to be washed in water brought from this place, and until this ceremony was completed he was not considered fit to take upon himself the reins of government : to insure the benefits of absolution, it is considered necessary, that the person should ever after forego the use of some kind of food ; but as this is left entirely to the person's own choice, such articles are commonly selected as are either not particularly liked by them, or such as are not often procurable. At the point where the water first shows itself, the large stone that covers the orifice as well as those on either side of the stream, were formerly gilt by a Khamptee Raja,

a portion of which gold is yet visible. The water of this streamlet is warmer than that of the Burhampooter, but is of a disagreeable taste. I was told by my guides, that the rains of 1843 considerably altered and damaged the place.

On my arrival at the Khamptee village I left by boat, and again reached the post of Laikwah, on the 30th December.

Religion.—The Mishmees seem to have but a very faint idea of any religion: they, however, worship a numerous set of Deos or gods, a great many of whom do not appear to have a name; the most to be feared amongst them, is the god of destruction, named Mujeedagrah, who in his attributes much resembles the Hindoo Sheo or Maha-déo. Sacrifices are also offered to Damipaon, who is the god of instruction and the chase; to Tibla, as the god of health and disease; and these two last named together with a god called Prepang, are supposed to wander about in company from place to place. When any disease appears in any of their houses, a priest of these people is sent for to drive away the evil spirit. This ceremony is performed in the following manner: The time fixed on for commencing is sunset, when the inmates of the house and the relatives of the person concerned are assembled within the house; and the priest having placed himself in the centre, he commences chaunting a dismal kind of dirge in a most monotonous strain. After this has continued some time, the priest rises with a fan in one hand, and a box containing pebbles in the other; with these he dances about on a mat, flourishing his fan and rattling his box: after this has lasted some time, he leaves his mat and begins moving up and down the house, continually singing the same tune; and arriving at the door, he pretends to drive the spirit out of the house: this is repeated several times, after which the intended sacrifice is led forth, and after much unnecessary cruelty, is killed by the priest and offered to the supposed spirit.

These people do not appear to have any very distinct conception of a future state, but suppose that all, whether good or bad, will go to the same place as their fathers and mothers have before them; and that, if the friends and relations of the deceased offer up sufficient sacrifices in their name, they will be permitted to return again to the earth, but failing in which, the spirit of the dead becomes an avenging demon, empowered to work all sorts of evil on the heads of the relatives who have omitted to perform the necessary rites.

Burials.—On the death of any person of consequence, the body is buried, and, according to the wealth of the family, a greater or less number of animals are slain, and the heads deposited around the grave on a frame-work of wood, in the centre of which a circular house is built over the grave itself, in which is placed flesh, both raw and cooked, together with grain, spirits, &c. and all the arms, clothes, and implements necessary for a person whilst living. Should the person be poor, the body is either burnt or thrown into a river if near at hand.

Births.—When the time of a woman's confinement is near at hand, a small shed is erected for her reception in the jungle near the house, in which she remains until the time of her purification is completed. If the child proves a male, this lasts for ten days; but if a female, for only eight from the day of its birth: during this time the mother is fed from the house, and none but her female relations are allowed to visit her.

Marriages.—Marriage amongst the Mishmees is perhaps the most singular custom that prevails regarding this ceremony. Alliances are usually contracted by the parents for their sons and daughters; and on the part of the man, presents to a large amount are required to be given to the father as the price demanded for his daughter, and which are usually proportioned to the rank and beauty of the woman: these presents consist of buffaloes, cows, gongs, salt, &c. &c. with a large quantity of dried field mice and fish. The wives allowed to one man are not limited to any number, but do not often exceed four or five. When a man dies or becomes old, it is the custom of these people for the wives to be distributed amongst his sons, who take them to wife; but the mother of any of the sons is always transferred to one of her husband's sons by another wife, so that a man is not actually obliged to marry his mother, but merely his father's wife.

Dress and Arms.—The dress worn by the Mishmees consists of a cloth bound round the loins, which passes between the legs, and is fastened in front, and a coat without sleeves that reaches from the neck down to the knees; two pouches made of fur are used, in which to carry their pipe, tobacco, flint, steel, &c., and on the back is carried a flat shaped basket, which is covered with the long fibres of the Sinwa tree, and ornamented with the tail of a Lama cow; below the knee is bound a quantity of finely split cane. The dress of the women is made of exactly the same material as that of the men, and consists of a bodice which barely

serves to cover the breasts, and a skirt that reaches from the waist as far as the knee; on the head is worn a tiara of silver, and a profusion of beads are suspended around the neck.

The principal weapons used are the spear, and a straight sword of Lama manufacture, to which is occasionally added a matchlock or crossbow, from which are projected poisoned arrows. When proceeding on any expedition of danger, a strong coat of sufficient thickness to ward off the force of an arrow is added to their costume, as well as a cap of fur, or split bamboo.

In person both male and female are disgustingly dirty, and, with the exception of a few of the chiefs, are seldom washed from one year's end to another.

Manufactures.—The clothes worn by these people are for the most part made by themselves, and consist of cotton which is cultivated by them for the purpose, and a few woollen articles made from the fleece of the Lama sheep, and in appearance seem to possess great durability both as to color and material. The hills, however, beyond the first range of mountains bordering Assam not being capable of producing cotton, the people beyond these limits are therefore entirely dependent for dress on the Mishmees bordering Assam, and the Lama people on the north side of the snowy range. In all other branches of manufacture, these people seem to be very deficient, and with the exception of spear heads and a few articles of this description, are capable of producing no kind of utensils that might prove of use to them in ordinary life.

Trade.—Trade is carried on by the Mishmees almost entirely by barter, and the tribes to the north of the Burhampooter may be divided into two classes, namely, those who trade with Assam and those who trade with the Lama people; the first usually bring down to Assam, swords, spears, gongs, copper vessels, with small quantities of Mishmee *teeta* and poison, which they exchange for cattle, salt, and various kinds of cloth, beads, &c.; but most of these articles not being produced by themselves, they are obliged to procure them from the Mishmees who trade with Lama, and for which they give cloths made by themselves, and those they take back from Assam. The second division having nothing to offer in barter but the Mishmee *teeta* and poison, which is only to be found on the mountains near the limit of perpetual snow; being in great request by the people of Tibet, they are enabled to exchange it for cattle, gongs,

swords, and copper vessels : they also barter a great deal among themselves, but the difficulty of passing through the country must always in a great degree tend to hinder the advancement of trade, as from the nature of the country it can scarcely be expected that any other mode of conveyance can be adopted, than that of carrying all goods in the baskets at present in use amongst them, which are placed on the back and supported by a band which passes round the head.

Houses and mode of Living.—The habitations of the Mishmees are generally, as much as possible, hid from the view by being placed in patches of jungle left for the purpose of concealment; they are usually built apart from each other, and unlike most other people, these Mishmees never congregate in villages. Their houses are all constructed with raised platforms, and vary from 12 to 15 feet in breadth, and 120 and 180 in length : a passage down one side communicates with the rooms, which are divided off into lengths of from ten to thirty feet long; down the whole length of this passage two bamboos are placed, on which are ranged the heads of all the animals that the owner of the house has killed during his lifetime, and which being constantly exposed to the smoke from the fires, and plastered with blood on the occasion of any animal being slain, turn to a perfectly black color with a fine polish. Above the fires, one or two of which are placed in every compartment, are hung crates of bamboo, which are used for drying and smoking whatever articles are required ; and about these compartments blocks of wood are strewed, which serve the inmates for pillows. The under part of the house is appropriated to the pigs and fowls, in which they are confined by a paling of wood. The staple commodity of food cultivated by these Mishmees is a grain called babosa ; it is used both for food, and to prepare an unfermented liquor, which is drunk in a hot state as soon as made. Rice is grown, but in small quantities, and merely by those tribes in the vicinity of Assam, and is not capable of being cultivated on the mountains in the interior : they however possess other kinds of grain, such as buck-wheat, Indian-corn, baitnah, &c. ; but should all these fail them, they are capable of existing on the interior part of the Sinwah and Dhainkceah trees, which afford sufficient nutriment to preserve them from starving, and affords excellent food for their pigs, on which they are commonly fed.

Flesh of all kinds is in great request, and all animals, from a mouse to an elephant, are eagerly devoured by these people, mercly with the exccption of crows, the black ape, and muster* found in rivers: that of the women is much more limited, being confined to fish, wild birds, and field mice; but, however fond they may be of animal food, they have not yet paid any attention to the breeding of cattle, but kill and eat whatever they may be able to purchase immediately on arrival at their villages.

Customs, Manners, &c. &c.—The domestic economy of the Mishmees does not appear to be burthened with many customs or observances such as are met with in civilized life; but, nevertheless, some of their habits appear but little adapted to a savage state, amongst which I may mention the practice of not eating flesh, or any thing but plain boiled grain in the houses of their superior relations by marriage, but which does not apply if the case is reversed, as the superior relations are not prohibited from eating whatever may be offered to them in the houses of their inferior rclations; but as marriages and intermarriages are very common, it is but very seldom that a married man is capable of partaking of the rights of hospitality amongst his own or the neighbouring clans, although there may at the time be enough or even more than enough to satisfy all.

The whole of the tribes to the north of the Burhampooter as far west as the Degaroo and the source of the Tiding rivers, and to the east as far as the Doo river, may in a political sense be treated as one people, although the divisions amongst themselves into clans are numerous, among which the Taen and Maroo hold the two first places; but, being so intimately connected with the other clans both by the ties of marriage and interest, cannot be regarded as a separate people or distinct from each other in any way except in name: every clan has, however, a nominal head; but the power of their chiefs is extremely limited, and may be set at naught by any person who considers himself sufficiently powerful to assert his independence. Laws and punishments seem scarcely to exist, and with the exception of murder and abduction, no other crimes against each other appear of common occurrence; this last is, however, a fruitful source of dissension and quarrel, and when any case of the kind takes place, the person from whom the woman has been taken, demands the amount he

* Sic in MS.—Eds.

paid to her parents for her from the man who has taken her away, which if he gives, the affair is generally ended, as they never take back a woman who has misbehaved in this way; but should the man refuse, or be unable to pay the demand, the man who has lost his wife, lies in wait to slay the seducer, and if successful, it then becomes the duty of his relatives to avenge his death.

Agriculture appears to be conducted in the most rude and simple manner, and the use of the plough is unknown. When the time of sowing approaches, the surface of the ground is merely scratched with a small kind of hoe, which penetrates but a few inches into the earth; and domestic animals, with the exception of pigs and fowls, are not reared.

Slavery does not exist to any very great extent amongst them, and is chiefly confined to such individuals as they are enabled to purchase from other tribes, although some few instances of persons being sold of their own tribe amongst themselves are to be met with. It is, however, carried to a far greater extent by the people on the other side of the snowy range, and I am given to understand that whole villages of Assamese are in great numbers in the Lama country.

Geography.—The geographical features of this part of the Himalayah range, do not in any very essential particulars differ from those of other mountainous countries: in every direction it is intersected by small streams, which either fall into the Burhampooter or the larger tributaries to this river, the Tiding, Dillee or Doo. The height of the mountains is somewhat less than those more to the west, and with the exception of the snowy range itself, no mountains on the side of Assam are covered with perpetual snow, although during the winter months the peaks of all of them become more or less covered; but even at these heights the fir, which is usually indigenous to mountain tracks, does not exist, being entirely confined to the Lama country, and the part of these hills marked in the map as the Myjoo country.

Geology.—As the formation of these mountains is entirely confined to primitive description of rocks, it does not perhaps afford so fruitful a field of investigation into the science as may be found in other parts of the world. It nevertheless must possess some interest to the geologist, as almost every variety of these rocks is to be met with in the greatest profusion; a considerable part of the first range passed over by myself is composed of dolomite or gypsum, in which also is to be found a great

quantity of alabaster. On the left bank of the Tiding, primary limestone prevails; beyond which micaccous formations are numerous, which in the vicinity of the Toolooah river become mica slate. Serpentine abounds in the bed of the Burhampooter, and granite would appear to occupy the higher elevations of the mountains, as I did not perceive any in sitû, although boulders were plentiful in all the streams. I however beg to submit these observations with diffidence, and trust that the few specimens forwarded herewith may throw some light on this subject when submitted to more competent judges than myself.

My dear Sir,—I have the pleasure to forward two heads of the animal which, in some of your communications you informed me, were supposed to belong to an animal somewhat resembling the African Gnoo.* It however appears, from the descriptions given of it by the Mishmees, to be of the deer [antelope] kind, and is called by them *Takang*, and by the Khamptees, *Khing*. In size the animal is but a little smaller than a buffalo, having an immense chest and shoulder, but small hind quarters; the fore-legs are large and powerful, but taper off below the knee; the under part of the neck is furnished with a dewlap that reaches nearly to the ground, and is covered with long hair; the skin is speckled, and on the top of the back and neck is almost black; the tail resembles that of the deer, being only two or three inches long, and is turned up when the animal is in action. It is only to be found near the snow, and is said to be very fierce and dangerous to approach.

The fur cap that accompanies the heads is made of this animal's skin: the larger head is of a male, and the smaller of a female; but the —— † of both have been as much as possible cut away to enable the hunters to bring them in. I am happy to say, that I have been promised by the Rannah Gohain's son a complete set of all the bones, together with the skin of the beast, which I hope he may shortly succeed in procuring. The other head is that of a Lama cow.‡

* This animal is supposed to be as yet undescribed. I will forward the specimens by the first opportunity.—F. J.

† Illegible in MS.—Ed.

‡ Most of the specimens here mentioned have arrived at the Society's Museum, including a skin of the *Takang*, and a frontlet and horns; also the head of the "Lama cow," which would appear to be of the hybrid Yak race, termed *Yho* and *Yho-mo*, was according to the sex. The *Takang*, however, cannot well be described until its bones or at least the entire skull, with the skin of the face and the extremities, come to hand.—*Cur. As. Soc.*

Soon after my return from the Mishmee hills I again left Saikwah, and proceeded by elephant up the Koondil-panee, and after passing the mouth of the Depho-panee, followed up the course of that stream, until I arrived at the foot of the hills; and as the fort I was in search of was said by my Khamptee guide to be between the Depho and Jameesa, I took a direction through the jungle about east, and without much difficulty arrived at the fort five days after quitting Saikwah.

This fort* is said to have been built by Raja Sisopal, and is situated on an elevated plain at the foot of the hills; the extent of it is considerable, as it took me about four hours to walk along one side of its faces: the defence is double, consisting of a rampart of stiff red clay, which, as the surrounding soil appears of a different nature, must have been brought from some distance. Below this rampart is a terrace of about 20 yards in breadth, beyond which the side of the hill is perpendicularly scarped, and varies from 10 to 30 feet high; the principal entrance, and the defences for some distance on either side, are built of brick, and on many spots in the interior I observed remains of the same materials, so that in all probability the houses occupied by the inhabitants must have been built of masonry. As I was unable from scarcity of provisions to remain more than one day at this place, I could not examine it so minutely as I could have wished. It seemed however to be composed of only three sides, the steepness of the hill at its north face precluding the necessity of any other works. At present the whole of the northern part of it is thickly covered with tea, which extends, according to the Khamptees who know the locality well, in a belt of more than a mile in depth all along the foot of the hill within the fort, and not as marked in my map, which was drawn before I visited the place. More to the west between the Dihing and Dehong is a much larger fort, and, as I believe, entirely composed of brick, as well as a tank of similar construction, surrounding which are numerous hill forts of small dimensions erected by a Raja named Bhishmuk, and the popular tradition amongst the people of this part of the country is, that on the destruction of the empire of these kings by the Hindoo god Krishno, the people who

* Of these forts we had very imperfect information before, and I believe Lieutenant R. is the first officer who ever visited them. They refer to a time of which we have no history or even tradition, further than frequent traces of the dynasty of the Pals throughout Assam.—F. J.

were able to make their escape fled to the hills, and have in the course of time become converted into the present tribes of Abors*. Near these forts a great number of wild Methuns† are to be met with, and the whole of the country, from the mouth of Koondil to the base of the hills, presents many indications of former cultivation. On this expedition I was absent nine days.

Dibrooghur, 6th February, 1845.‡

Note on a curious Sandstone formation at Sasseram, zillah Shahabad.
By Lieut. W. S. Sherwill, *66th, B. N. I. With a Plate.*

At the foot of a hill at Sasseram, zillah Shahabad, which forms the termination of a spur thrown off from the Northern face of the lofty range of the Kymoor Sandstone Mountains, I observed a curious apparent horizontal columnar formation in the sandstone, as shown in Plate 1. The disposition of the sandstone at this spot has all the appearance of a quantity of horizontal columns, of several feet diameter each, and overlying each other to the height of twelve feet, the lower ones much flattened by pressure. At this spot also they have suddenly ceased, terminating in a steep bank, from which they protrude in great numbers, resembling a series of rudely-pointed horizontal obelisks, weather-stained to a very dark hue, with a strong cobalt tinge. Their exposed situation at this spot has tempted the Sasseram stone-cutters, who, with wedges, have cloven blocks from off these columns for building purposes; but by so doing, have made it evident that they are not solid columns, but a series of spheres; each sphere composed of a great variety of differently colored and exceedingly hard concentric strata of siliceous sandstones, concentric upon a nucleus, but the strata exceedingly difficult to exfoliate, the rock being purely siliceous, throwing back the hammer with great force. These spheres are packed closely together, and so inti-

* If the Pals were Buddhists, this tradition may allude to their overthrow by the Rajas of the Brahminical faith; but all authentic records of those times appear to be lost, at least in this province.—F. J.

† *Bos. frontalis*, or an allied species.—*Cur. As. Soc.*

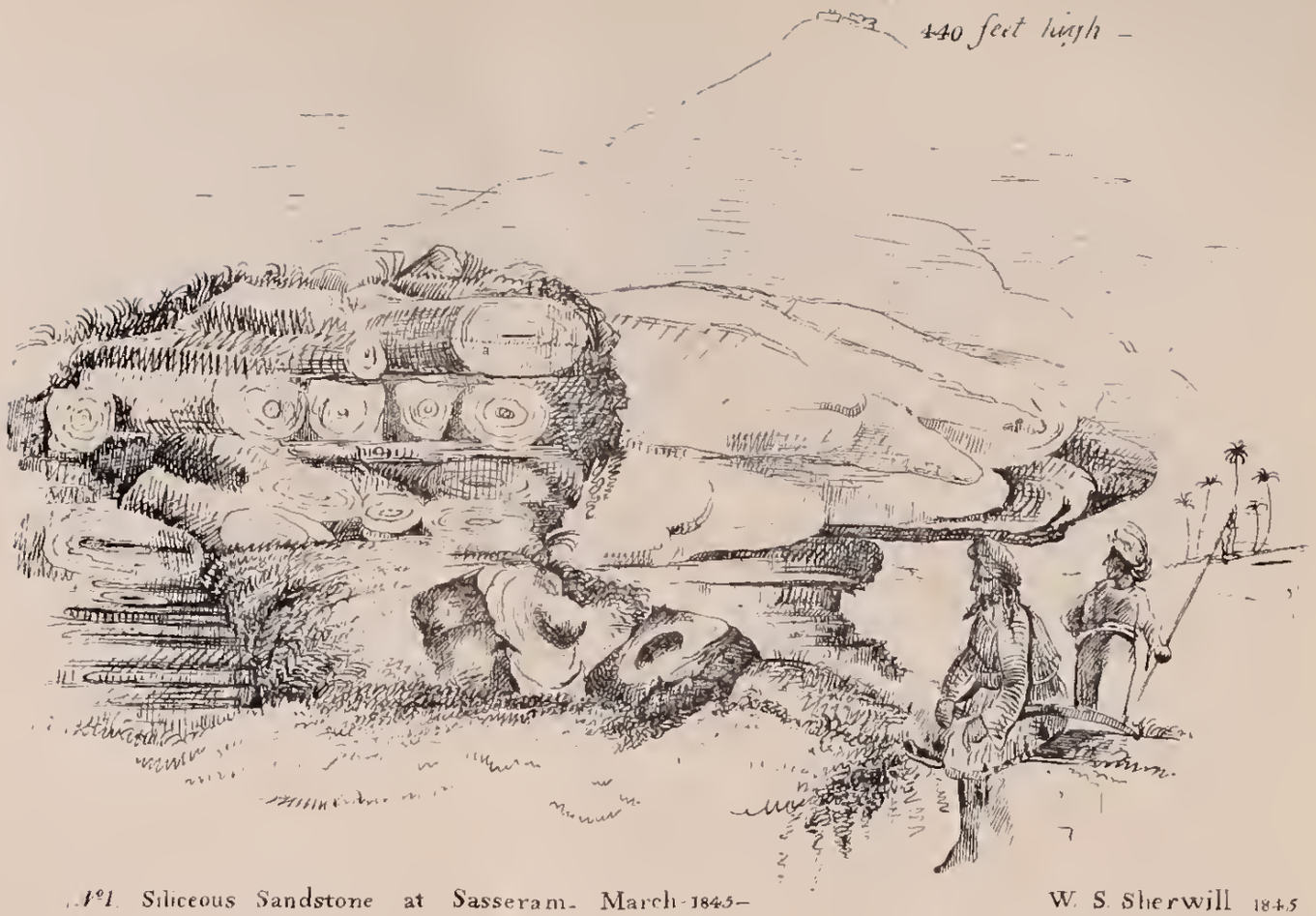
‡ I enclose a copy of this letter as a part of Lieut. Rowlatt's Journal.—F. J.

mately joined by some great pressure as to resemble columns; the pressure that has brought them into contact, whether from below, above, or laterally, has caused them to be much flattened on every side, so much so that they resemble square columns, varying from two to twenty feet in length; but on a closer inspection, the joint of each separate sphere may be traced on the side of the exposed column.

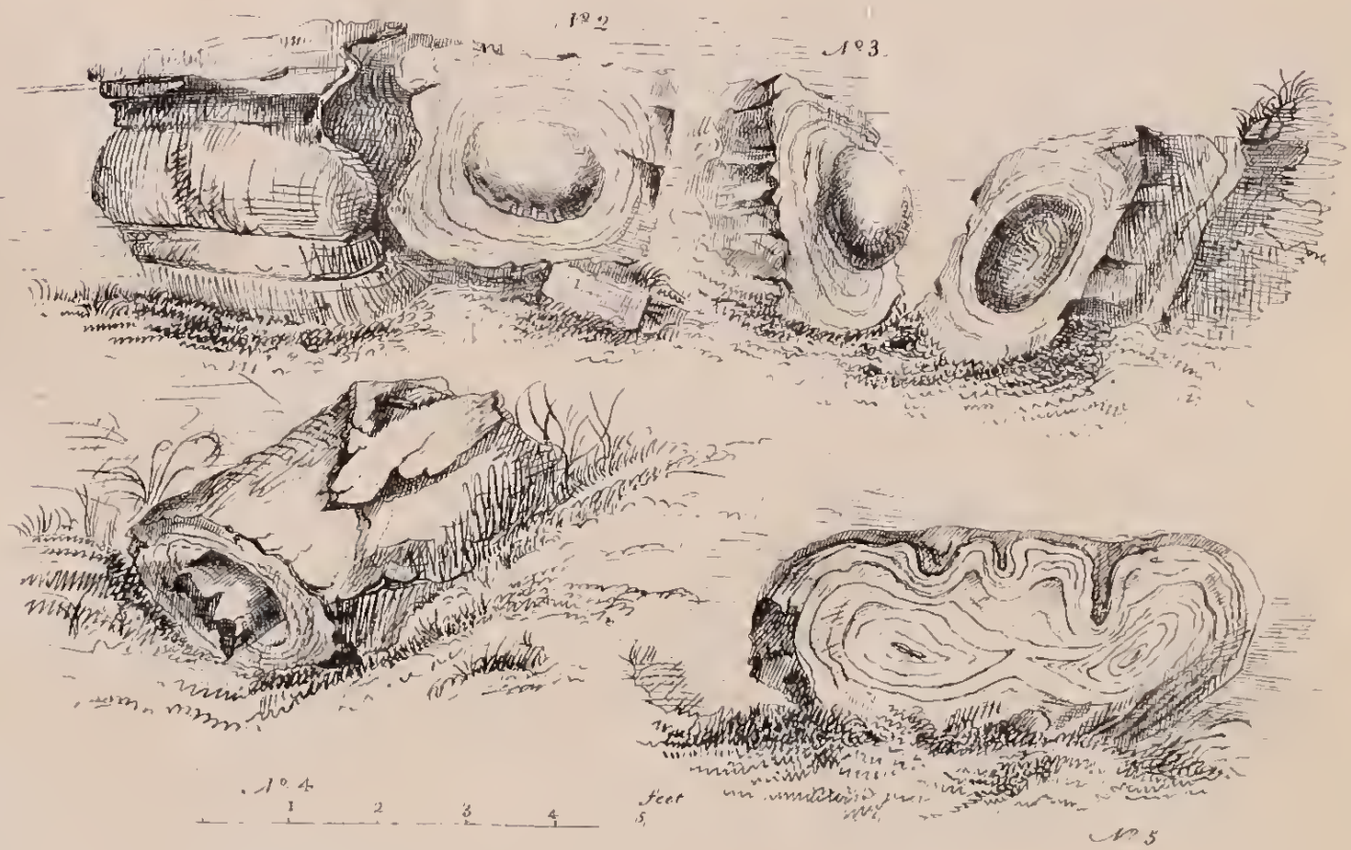
The bed, as far as exposed, Fig. No. 2, is about twelve feet in height, the top row of stones generally being nearly perfect circles, of about three feet diameter, the centre ones elliptical, and the lower part of the bed is composed of a series of layers of much flattened spheres, varying from ten to two inches in diameter; and although crushed into so small a space, each individual stratum, however fine or thread-like in its structure, is perfectly preserved and well exhibited.

In Fig. 3, where with the aid of steel wedges I managed to burst open a sphere, the fracture has taken place in the middle of a thin red gravel-like stratum of about one-eighth of an inch in thickness, and not through the whole strata or concentric coats, but leaving a corresponding hollow, from whence the globe containing the smaller strata and nucleus has started: upon chiselling away the outer surface of the protruding ball, another coloured stratum is discovered. In Fig. 4, a flattened globe presents its central group of strata projecting as a cylindroid; the fracture here, as is generally the case, has occurred at one of the gravel-red strata, of which nature are all the delicately pencilled concentric rings noticeable on the fractured surfaces of Nos. 1, 2, 3, 4 and 5 Figs. The intermediate strata are composed of fine white arenaceous particles, intermixed with red, black, and brown particles of the same nature. The red lines, which in some specimens are almost invisible from their extreme fineness, are evidently tinged with the oxide of iron, traces of which are also visible on the outer coating of the globes. Some of these globes, flattened out to an immense size, I have calculated must have been six feet in diameter when perfectly spherical, with many hundred concentric strata, though not all perfect, some running into and crossing each other in great confusion; but the generality of the well developed strata are perfect.

It is difficult to imagine how such a series of not only concentric lines, but concentric spheres, similar in arrangement to the coats of a bulbous root, could ever have been formed upon so grand a scale, for



№1 Siliceous Sandstone at Sasseram. March 1845– W. S. Sherwill 1845



Sandstone Formation at Sasseram 1845 March.

W. S. Sherwill - 1845 (Siliceous)

in their formation no trace is left of the globes ever having, at any period, been at rest. Had they been so, the point d'appui, or that part pressing or resting on the ground, most certainly would *not* have had the concentric strata passed under it; that the strata *are* concentric to a common nucleus I have proved by bursting open many of the globes, the strata invariably exfoliating as in Nos. 3 and 4. The nucleus, whatever it may be, must be an exceedingly small and insignificant particle, as I have fractured through several globes to within a quarter of an inch of the innermost centre, and found nothing; the strata varying from the fineness of a hair to six inches in depth, and the spheres from six feet diameter to the size of a pea.

Having noticed a series of what I thought were the projecting edges of small shells running in a straight line nearly parallel to the major axis of one of the elliptical stones, and traversing all the strata, (vide No. 1, fig. *a*,) I had it broken open in that line; and in so doing, exposed to view a bed of about a foot in width, of very closely compressed blotches, of a delicately soft argillaceous substance, of a pale yellow color, impalpably fine when dissolved in water; no individual particle being visible under a powerful lens.

I traced this curious formation for about two hundred yards along the base of the hill where it suddenly ceases, the sandstone regaining its usual horizontality of stratification.

Notes, chiefly Geological, across the Peninsula of the Southern India, from Madras, Lat. N. 13° 5′ to Goa, Lat. N. 15° 30′ by the Baulpilly Pass and Ruins of Bijanugger. By Captain Newbold, *F.R.S., M. N. I., Assistant Commissioner Kurnool, Madras Territory.*

Physical aspect of the plain between Madras and the Naggery mountains. The country lying between Madras, and the Eastern Ghaut line of the Naggery hills, is a maritime plain, about 34 miles broad, rising gently towards the base of the mountains. It is watered by the Coom stream, which finds its way to the sea at Madras, and by the Cortelair which, after receiving the Naggery river, communicates with the sea by the salt lagoon of Ennore, about ten miles North of Madras.

A few gentle undulations or swells running generally to the S.W. alone interrupt the flat monotony of this great plain, the surface of

which is studded with numerous trunks, and often verdant with rice and raggi cultivation.

Plantations of the betel-vine and patches of sugar-cane are scattered here and there, and tall groves of cocoa-nuts and palmyras tower over an underwood composed chiefly of the dwarf date, cactus, euphorbia, and mimosa. These form a low jungle covering the higher sterile, dry patches, which intervene between the lower cultivated portions.

Soils. The surface soil is usually sandy, and many extensive tracts are entirely covered with a fine sand resembling that of the sea, and lateritic debris. The sandy soil occasionally passes into a silt and fine red clay, largely used in pottery and brick-making.

The subsoils are in some situations beds of kunker of various thickness, of *mhurrum*, or disintegrated rock, and granitic and hypogene rocks; thin beds of grey marl overlie, near the coast, beds of a black clay imbedding pelagic shells of recent species, laterite, and a loosely aggregated sandstone which passes into slate clays, both white and coloured, with oxide of iron of various shades.

Of the rocks above-mentioned granite, gneiss, and hornblende schists are found basing all the rest, occasionally rising above the surface, but in general thickly covered. The granite near the coast is usually of the variety termed pegmatite, being composed of quartz and felspar exclusively; above the surface it commonly appears in naked bosses, and detached concentrically-weathering blocks. On approaching the base of the mountains these blocks become more frequent, and are mingled with similar globular masses of basaltic greenstone, outgoings of the numerous dykes which prevail in the granite and hypogene rocks. Fragments of quartz rock, chert, jasper, and sandstone also occur, more or less rolled, derived doubtless from the Naggery beds. The gneiss usually contains hornblende.

Occasional beds of laterite occur. One I observed between Madras and Poonamallee, which passes into a loose sandstone and felspathic shale. Laterite has been employed in the construction of the fort at Poonamallee and in the revetment of the old fort of Tripassore.

Eastern Ghauts. The southerly line of Ghaut elevation appears to terminate on the N. bank of the Naggery river, south of Hodgson pettah, and farther west in the bluff peak of Naggery nose; but it, in reality, suffers a deflection westerly and southerly, forming a great mountainous

curve by Muddoordroog, Chellumpolliam, and Mymundeldroog to the great break of the Eastern Ghauts at Sautghur.

The low hills at the foot of the Naggery chain are of granite, gneiss, hornblende, schist, and basaltic greenstone. The height of the main chain itself near Cumbancumdroog, where it supports a small table-land, is stated at 2550 feet above the sea. The sandstone cliffs by which the chain is crested have a columnar aspect; but those forming the lower part of the ridge clearly proved this appearance to be deceptive, and that the rock rests in thick beds on the granite, having a dip towards the west. The columnar appearance is owing to the nearly vertical fissures which intersect the strata at right angles; and which, in the thicker beds, constitute their most marked feature. A highly illustrative instance of the jointed structure is seen in the mural sandstone cliffs cresting the sacred hill of Tripati. These cliffs usually support table-lands of greater or less extent. To the east of the chain, between it and the sea, runs a low flat-topped ridge, which for want of leisure I was unable to examine. The Naggery hills, as the traveller proceeds in a N.W. direction, lose their peculiar crested appearance, and acquire a smoother outline,—a feature possibly to be attributed to the almost total disappearance of the granite and greenstone on which they rest. The Tripati spur, however, which takes an abrupt turn to the east, resumes this appearance ;* but it again disappears in the hills of Curcumbaddy: the latter, as we ascend towards the table-land, diminish in height, and acquire rounder tops and gentler declivities, in general clothed with vegetation.

Tripati. The approach to Tripati from the south is extremely beautiful, lying over a large and cultivated plain cinctured by an amphitheatre of picturesque hills. The plain gradually slopes to the foot of the holy mountain, at the southern base of which the town of Tripati lies. The mountain itself, with its mural crest of reddish sandstone, the path for pilgrims to the celebrated shrine leading up its steep side, commanded by three antique pyramidal gateways, and the town at the

* I have since heard from Capt. Bell, Engineers, that a porphyritic granite is seen at the western base of this sacred mountain. Greenish and dark coloured whetstones are often used by native barbers all over the country, which are quarried in the argillaceous beds near Tripati, but are not so much prized as the imported Turkey oil stones.

foot overlooked by lofty pagodas,—form an interesting study for the pencil. The surface of the plain is covered with a reddish sandy soil. The old boundary of the Tamul and Telinghi kingdoms, the Andra and Dravida-des, is in this vicinity.

Curcumbaddy. From Tripati to Curcumbaddy the road skirts the southern flank of the Tripati hills in an E.N.E. direction to Curcumbaddy. The rocks in the immediate vicinity of Curcumbaddy are of a crystalline sandstone passing into quartz rock of a white or slightly green hue, radiated with red bands.

Baulpilly. From Curcumbaddy the road at first lies over a short table-land, and then descends into the valley of Baulpilly, bounded to the E. and W. by two ranges of hills. The face of the country is covered with a thicket abounding with bamboos. The soil is red, but darker and softer, from the admixture of argillaceous and calcareous matter, than that hitherto seen : it contains vegetable matter mingled with the alluvium. Bajra, raggi, and culti are cultivated with success. The formation consists of sandstone less quartzose than that of Curcumbaddy, and of the argillaceous shales into which the Cuddapah limestone passes. The lines of cleavage in the latter are nearly vertical, and almost at right angles with those of stratification; but I did not observe them passing into the structure of the sandstone. This may be seen near the rude barrier gate of the Baulpilly Pass. The softer shales are usually found in the lower parts of the valley, and the sandstone capping these summits of the hills. Dykes of basaltic greenstone occur traversing the shales and slates; also veins of quartz. Fragments of flinty slate, chert, and jasper are frequent. The surrounding country is wild and romantic.

Codoor. The road passes partly through a bamboo jungle up the centre of the Baulpilly valley in a north-westerly direction to Codoor, a small village in the Cuddapah collectorate, 108 miles travelling distance N.W. from Madras. Here the hills on either side open out into a delightful plain watered by the Gungama, and smiling with cultivation, principally of bajra, raggi, culti, and indigo. The Pass of Baulpilly leads over a rocky belt that stretches across the valley, and forms an anticlinal line, from which the Gungama and a branch of the Calastry river flow in contrary directions; the first towards the N.W. to the Pennaur, and the latter towards the S.E. by Calastry. The

formation is argillaceous limestone passing into argillaceous shales, capped occasionally by sandstone. Extensive deposits of kunker contribute much to the fertility of the soil.

Nundaloor. The route from Codoor to Nundaloor, a distance of thirty miles and upwards, lies up the valley of Baulpilly, which is obstructed in many parts by rock spurs from the flanking ranges. Approaching Nundaloor the hills become barer, more conical and mammiform. Nundaloor is a small town, about 137½ miles N.W. from Madras, and situated on the left bank of the Baugonuddi or Cheyair stream, which flows northerly to the Pennaur river, east of Sidhout; and is here three furlongs broad, with a bed of coarse sand. The surrounding formation is argillaceous and calcareous shales, schist, and sandstone: the soil is sandy; and produces, among other articles, indigo and a considerable quantity of rice. The rice lands are irrigated by a large tank, situated a little to the west of the village, which derives its supply principally from the rain water that rushes down during the monsoon from the tops and sides of the hills lying to the westward. Palmyras appear to thrive in low situations in the sandy soil. In some of the hills in this vicinity the lines of stratification can be distinctly traced, even at a considerable distance. The strata dip at an angle of 12° to the south of east; the strike of the beds N. by W. The cleavage lines of the shales and schists are much more vertical than the planes of stratification, forming with them an angle of about 45°, but dipping in the same direction. The latter are distinctly marked, even in hand specimens, by alternate parallel light and dark bands. The seams are often filled with friable calcareous incrustations. From a compact argillaceous slate of a light greyish green with fine chloritic laminæ, it passes into white and purple shales. Minute spangles of mica occur disseminated. The sandstone, as we recede from the granite, becomes less crystalline, and acquires argillaceous matter, though veins of white quartz are still seen traversing it. The light coloured argillaceous slate, held in the platinum forceps before the blowpipe, whitens and fuses into a whitish enamel; the purple shale after deepening in colour melts partially, and with difficulty, into a number of minute greyish globules. With borax it fuses into a light green glass, which becomes greyish on cooling; and, with carbonate of soda, with effervescence, into a glass of a darker green. The soil here is sandy and calcareous; debris of the sandstone, limestone, and clay

slate. From Nundaloor the range of hills flanking the western side of the valley is crossed by a defile to the plains of Cuddapah. The summits of many of these hills are capped with sandstone ; while limestone and its associated shales are seen near their bases in the vallies, as at Wontimetta and near Bankrapet.

Cuddapah. Cuddapah is situated at the western entrance of the flat valley of the Pennaur, from which river it lies about six miles south. The height of the plain, in the midst of which Cuddapah is situated, is about 500 feet from the level of the sea. The Pennaur flows at the base of the northern range in an easterly direction towards Nellore, below which it disembogues into the Bay of Bengal. The stream, on the banks of which Cuddapah stands, takes its rise in the hills to the south of the place, and pursues a northerly course to the Pennaur. Other streams of minor note intersect the plain. The soil covering the surface is generally black, mixed with sand and calcareous matter: to the west of the cantonment, a thin stratum of sandy soil overlies a bed of kunker, from one to four or five feet thick; in some places compact like travertine, and in others having a pisiform, tuberose, and tufaceous structure. Some specimens when broken exhibit a crystalline radiated structure; others a concentric form. Below this lies a bed of limestone, generally purple andof a shaly structure, mingled with argillaceous matter. The bed of kunker, however, does not always intervene: the latter rock, where it is tufaceous, has often a concentric appearance resembling stalactite; and sometimes appears in pisiform concretions both detached and adherent to the subjacent mass. It is still in process of formation from water slowly percolating from below; the stems of the grasses around which it has formed, are often found undecayed.

Eastern Range. Ghauts, North of Cuddapah. On ascending the range, north of Cuddapah, where it overlooks the diamond mines of Chinnoor and Ovalumpully, I found the base and sides to be covered with angular fragments of a very hard ferruginous sandstone. Advancing a little way up the ascent, a narrow bed of a greyish quartz, following the line of bearing, is crossed. Here and there slightly convex plateaus of compact crystalline sandstone, passing into quartz rock, of various shades of red, are observable amid the loose blocks and vegetation with which the surface is almost concealed. Large amorphous masses of the greyish quartz rock appear at irregular distances on the summit; some of them ten feet high.

Fragments of the same are strewed around, partly lying upon, and partly imbedded in, a fine reddish soil resulting from the weathering of the subjacent rock. Near the summit I picked up pieces of a vesicular ferruginous rock with tubular sinuosities, a species of laterite, and apparently of the same structure as that on the summit of the Ganjicotta hills. The tops of these, as well as of the other hills in the vicinity, present slightly convex plateaus forming table-lands of circumscribed extent. The relative altitude does not suffer any considerable variation, not exceeding, I believe, 1500 feet above the level of the plain. The sides are deeply indented by abutments jutting out at right angles to the line of bearing. In the ravines that separate them, fine echoes are produced. The sides and summits are thickly clothed with vegetation and low forest. The wells at the base of the range to the south of Cuddapah are cut through strata, varying from eight to twenty feet in thickness, of compact and tufaceous kunker.

Bankrapet Range, South of Cuddapah. Passing the small tank of Ipa-Penta, the ground gradually ascends and becomes jungly. Several rivulets are crossed until a rather high ground is reached, where two defiles branch off; the one to the left or east, leads to the water-fall of the Pedda Garhi, and the other to the right to that of the Chinna Garhi. There I pitched my tent on the right bank of a stream, and proceeded on horseback over a stony jungly path winding through defiles, overlooked by jungly hills and mural precipices of sandstone. The Pedda Garhi is one of those singular fissures through the sandstone, like that of Ganjicotta, cleaving the rocks diagonally across the line of stratification from the summit to the base. The sides are precipitous rocky façades, narrowing rather abruptly, as the traveller advances southerly, into a fissure two or three yards wide, with salient and re-entering angles. At the base of the western cliffs are pools filled with the clear water, which drips in a perpetual rain from seams in the disrupted stratified rocks which have a dip of about 8° to the N.E. The precipice on the left, or on the north-east, distils no water. Here we see one of the very few illustrations observed in Southern India of the theory of springs. The water evidently percolates through the porous strata capping the higher adjacent summits to lower impervious beds, where collecting it follows the dip of the strata, and finds an exit in the fissure which has

broken off the continuation; between the rocks on the right and those on the left, the latter are of course perfectly dry. The cleft in the rock proceeds, according to the natives, to a considerable distance, till at length, from the height and closeness of its high rocky walls, the rays of the sun are excluded. Natives from superstitious motives dread exploring its recesses, and tell many incredible tales of the vengeance with which the *Genius Loci* has visited intruders. The bottom of the fissure is completely covered with water to an uncertain depth. Hundreds of the finny tribe sport in the clear depths of the water, which I could not persuade the guides to attempt to catch, as they hold them sacred.

Chinna Garhi. I now proceeded to the smaller spring, or the Chinna Garhi. Here the water gushes in a small silvery cascade from a cliff about 200 feet high into a deepish pool among the rocks below, disappearing through a narrow cleft, probably a continuation of the principal fissure, to re-appear in the form of a spring below by some fault or dislocation in the strata. In the rains it cannot run off by this outlet as fast as it collects, and a large deep bason is formed, as evinced by the black ferruginous coating with which some of the rocks in the vicinity are covered. The temperature of this pool I found to be 68.5°, three feet below the surface; temperature of air in shade 80°; in sun 86°. The dropping of the thermometer into the water disturbed hosts of the small fishes that rose to the surface, evading all my efforts to catch them. The water is remarkably transparent, sparkling, and agreeable to the taste, probably from containing a large proportion of fixed air.

The formation of the range in this neighbourhood is a reddish white, and greenish sandstone, interstratified with shales of various shades of purple and light green, and passing into quartz rock, or arenaceous schists. Large cavities occur filled with beautiful crystals of quartz, and a little hæmatitic nodular and stalactiform iron ore. I observed a furnace for the smelting of this at the foot of the range. The rocks are distinctly stratified, having a dip towards the North and East, varying from 12° to 6°. The joints dip about 70°, and are crossed by others at nearly right angles, separating the masses into cubes and rhombs. The ripple mark is seen very distinctly on the lamina of some of the arenaceous schists. The soil is a light red, and sandy: the vegetation

on the hill sides, luxuriant. Few of the trees or shrubs were seeding or flowering, but amid a multitude of others I observed the Tectona grandis, Dalbergia latifolia, Pterocarpus Santalinus, Erythrina indica, the Mimosa Xylocarpa, Carissa spinarum, and the Ixora parviflora used for torches. In the plain are seen the Aloe perfoliata, Euphorbia, Cassia auriculata, Ficus indica, Elate sylvestris, Borassus flabelliformis, Melia azadirachta, Tamarindus indica, and the Asclepias gigantea. The principal articles of cultivation are saffron, indigo, white juari, raggi, rice, castor oil plant. Among the wild animals frequenting the hills are the tiger, leopard, bear, porcupine, wild bear, several varieties of monkeys, and also the Indian land tortoise.

I returned to my tent about 4 P. M., after being nearly twelve hours on horseback, and twenty-four hours without refreshment.

Started at three o'clock this morning towards Cuddapah: after about eight miles ride arrived at the *Bhuga*. This is a sacred spring in a shady Tamarind tope. The Hindus have erected a small *Gopar* over it, and conducted the water from the mouth of a sculptured cow or bull, to be seen at the bottom of the clear pool in which the water collects. In the shade of the tope stands a temple to the tutelar god of the spring, *Bhugama Iswara;* hard by are five or six other springs bubbling from the rock, and following into the river close by. The temperature of the two springs, which I tried at sunrise, I found to be the same, viz. 88°; of the water in the river 72°, and of the atmosphere 65°. The springs are evidently thermal. The cause of their appearance is a fault in the subjacent sandstone strata. They lie about ten miles N. by E. from the Pedda Garhi. The water appears perfectly pure and well tasted.

Chillumcoor. This village and halting place is about twenty-six miles and a half to the westward of Cuddapah. It comprises about eighty houses, inhabited chiefly by *kunbis*, or cultivators. There are also a few Brahmans and Mussulmans. It seems to have once been a place of greater importance, and its pagodas have an air of considerable antiquity: they are dedicated to Iswara and Hanuman. Inscriptions on slabs of red sandstone now lying prostrate, do not afford the date of the building of these structures; but inform us that the temple to Iswara was endowed by Harihara, king of Bijanugger, in 1305 of the Salivahana era, or

about A. D. 1383. The small *lath*, or pillar, in front of the temple to Hanuman, according to the inscription, was erected A. S. 1670 by Ram Reddy of Chintalconda, and Chunapa Reddi of Vellipaulum.

Cotton, indigo, raggi, juari, bajra, are the staple articles of cultivation. Soil, principally Regur with saline patches, taken advantage of by natives for the manufactory of salt. The adjacent country is a plain bounded to the north and south by low ridges of hills. Near the village the limestone alternates with thin beds of sandstone passing into a greenish arenaceous schist. A trap dyke has crossed both rocks; but, from the deep superstratum of soil the line of junction could not be seen. Fragments of rocks converted into jasper are seen marking the course of the dyke, which is attended by a profuse development of kunker. Incrustations of muriate of soda occur between the laminæ of the arenaceous schist, as may be seen in the well near the Traveller's bungalow. A little beyond this, a bed of a granular crystalline limestone is seen in contact with this schist, which, from the massive character of the detached blocks, and the structure and colour of the rock itself, has much the appearance of a grey felspathic granite or trachyte. To the N. E. it passes into a breccia with angular fragments of the arenaceous slate, siliceous limestone, chert and jasper imbedded. The presence of the two last minerals indicate the formation of this bed to have taken place subsequent to the intrusion of the trap dyke, which appears to have broken up the limestone and schist into the fragments now impacted in the crystalline breccia. The following is a section presented by a well in the neighbourhood of the village. *(See Plate.)*

The kunker is often dug out in rough square masses, and used in building walls. Blue limestone, with iron pyrites in nearly horizontal strata, is seen in the beds of all the rivulets in the neighbourhood, and also in the bed of the Pennaur, which flows about eight miles to the north of the village. The nearest hills are of sandstone.

Chittawarapilly. The road passes for the most part between two ranges of sandstone passing into arenaceous slates of various degrees of fineness and compactness, which generally dip at an angle of 6° to the E. N. E. The higher hills are crowned with thick beds of sandstone supporting table-lands. Vertical joints and fissures often intersect these

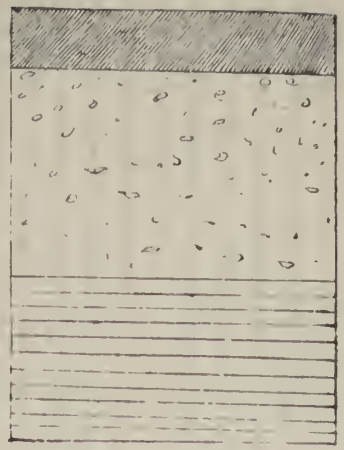


Plate to Art I of Capt Newbold's Geological Notes

nearly tubular masses, which give an appearance of a wall of Cyclopean masonry, running in a line with the crest as far as the eye can reach. The lower beds will be generally found schistose, and of smoother outline.

Range to the South of the Bungalow. The eastern extremity of the range to the south of the road has a remarkably rugged appearance, and large masses of rock lie precipitated on its base and sides. On ascending to ascertain the cause of disturbance, I found the hill to have been penetrated by the ramification of a large basaltic dyke. The rock composing the dyke passes from a porphyritic to a compact structure. Pale green felspar crystals are imbedded in a crystalline paste of hornblende. Circular and oval cavities, filled with a faint reddish mineral resembling cornelian, and a white mineral resembling prehnite, are found in the greenstone. In the compact varieties augite replaces the hornblende. Near the summit of the hill the basalt appears in four and five sided prisms, about a foot in length, the lower part of the joints convex, fitting into the concave surface of the supporting prisms. A thin incrustation of carbonate of lime occurs between the prisms. The sandstone is highly quartzose, and ferruginous, and acquires a cellular slaggy structure resembling some varieties of laterite.

In wandering among the chain of hills to the S. of the Bungalow, I picked up some slabs of laminar sandstone, from the surface of which project oval and circular concentric concretions, from the size of a shilling to that of a half-crown in circumference. The outer circle is nearly white, the second darker, enclosing a hard solid nucleus. These concretions are harder than the imbedding sandstone, from which they are with difficulty separated, and by weathering less rapidly, project in relief on the surfaces of air-exposed slabs: they penetrated from half an inch to an inch into the substance of the rock. When broken, they do not differ in appearance from the sandstone, except in being a little whiter, and of a finer sand. Some of the more finely laminated slates present on their planes vivid dendroidal delineations.

Range to the North of the Bungalow. The sandstone hills to the North of the Bungalow support the table-land of Ganjicotta. Ramifications of a greenstone dyke are seen to run along their base, attended by a profusion of kunker deposit.

Tallapodatoor. This village stands in a plain on the right, or South bank of the Pennaur, about twelve miles W. N. W. from Chittawaripilly. The Gundicotta hills flank its North bank, from which they are about three miles direct distance. At their base I found a siliceous greenish slate which, higher up the ascent, is capped by tubular masses of sandstone dipping conformably at a slight angle of about 4° to N. E. The general direction of the strata, and of the chain itself, is nearly S. E. The laminæ of the slates also run S. E., and are intersected by nearly vertical joints at short distances running E. S. E. These fissures pass into the superjacent sandstone. Cavities, which have apparently once been filled with a ferruginous earth or clay, are here frequent in the faces of the sandstone cliffs.

Concretions in the Sandy banks of the Pennaur. The steep bank of the Pennaur near Tallapodatoor is composed of a thick accumulation of sand, silt, quartz, and jasper pebbles, and kunker. The latter is seen often in stalactiform concretions in the substance of the sand and silt, which have been formed by the infiltration of water charged with lime. In many instances these concretions have formed round the stems and roots of grasses, some of which are still vegetating within their stony case; but by far the greater portion have withered, passed into dust, and fallen out leaving cavities or casts.

Small dunes of sand are seen in this vicinity on the South bank of the Pennaur drifted by the N. W. winds.

Tarputri. At Tarputri, the next march, are two handsome pagodas, dedicated to Chintal Raya and Ram Iswara, elaborately decorated with sculptured bas-reliefs representing the exploits of Rama, and the adventures of the Indian Apollo, Krishna, and other mythological events. Among them is a figure holding a bow, made like the Grecian bow, a form rarely met with in Hindu sculpture. The unfinished gateway of dark basaltic greenstone presents a mass of graceful sculpture scarcely excelled, in my opinion, by any thing in the ruins of Bijanugger, or Mahavelipur, though on a much minor scale.

The three Sassanams or inscriptions on stone in these temples, which I had copied, were in the Telugu character and language, may bear date severally 1429, 1431, and 1435 of the Salivahana era, and the name of the then reigning sovereign at Bijanugger, Narsengha Rayel.

Tarputri is still a considerable place: it is the capital of a taluk, with a population of about 4256 Hindus, (chiefly kunbis) and 2155 Mussulmans. The language is Telugu.

From Tullapodatoor to Tarputri, (about ten miles). The road lies over an extensive plain watered on the north by the Pennaur, covered with regur and a soil of a dark coffee red, except where limestone prevails, when it assumes a cineritious colour. The substratum is generally a bed of kunker. Trap dykes are frequently crossed. Tarputri is situated on the right bank of the Pennaur. The only hill in the vicinity is of greenstone, associated with a greenstone slate curiously mottled by dark oval spots. On the summit of this hill, I found kunker imbedding angular bits of the rock. Beyond Tarputri, near Vaimpully, close to a dyke of basaltic greenstone, masses of calcareous spar with quartz are seen jutting from the surface, many of them incrusted with drusy crystals of quartz. The spar, in some instances, has been penetrated by the basalt, and coloured of a dull green. Fragments of jasper, flint, chert, brown, green and white, are strewed on the surface. Mounds of kunker are also frequent. Trap dykes continue from Vaimpully to Ryelcherroo.

Ryelcherroo. Near this place limestone, sandstone, and sandstone conglomerate prevail, associated with jasper and chert. Tippoo, it is said, dug a considerable quantity of the latter for musket flints. The hill in which the excavations lie, is about $1\frac{1}{2}$ mile S. W. from the small fort. Its base consists of a greyish laminar limestone, with a rugged external appearance, and veined with calcareous spar and quartz. Ascending the hill, the limestone becomes less crystalline, and changes its colour to shades of a greenish blue and pale flesh colour, until the sandstone conglomerate, by which the hill is capped, is reached. A little below the summit amid the blocks of pudding stone and sandstone, lie Tippoo's excavations for flints; they are dug out in externally ochreous and rusty coloured, irregularly shaped, blackish, grey and white masses. They are a variety of chert far less tough than the English flint of the chalk formation, splitting easily on a smart blow. The summit of the hill is strewed with pieces of red jasper, and pebbles of a flinty quartz and calcareous spar.

A native of the village turns neat cups and vases from a pale yellowish and white magnesian limestone, which is procured at a hill in

the Pupál jungle near Yengunapilly, about eight or nine miles in a southerly direction from the Bungalow.* It is a low hill, rising abruptly from the Regur or cotton ground at its base, with a gentle slope from the east into low cliffs of limestone which front the west, towards which quarter the hill falls with an abrupt and steep declivity. The surrounding hills are mostly of sandstone. The base is composed of a crystalline bluish grey limestone passing, as the cliff ascends, into a number of beautiful shades of red, yellow, green, and white. Some dark green varieties resemble precious serpentine ; others imbed silvery white, and yellow pyrites. Calc spar, white, fibrous, and pale yellowish brown, occurs in veins, and coating fragments of rock. On the eastern slope of the hill is an excavation, whence the Brahmins dig a chalk, which is used for marks of caste, and for white-washing houses. At Putsa Marculpilly a massive asbestus, associated with a white magnesian and calcareous earth, occurs in a bed in the limestone. The former is of a dull greenish grey colour, passing into a mottled yellowish white. It is tough under the hammer, and breaks into fibrous flexible fragments.

Junction line of granite with the Limestone and Sandstone formation near Yairypully. A mile or two west from Ryelcherroo, between the granite range north of Gooty on the west, and the limestone and sandstone hills of Ryelcherroo on the east, extends a plain about a mile broad intersected by a nullah, which I examined in vain for a section showing the junction of the limestone with the granite. The surface of the plain is covered with angular pebbles of quartz, chert, jasper, and of a breccia composed of angular bits of quartz, derived probably from the granite, imbedded in a jaspery paste, and of a sandstone grit imbedding reddish jasper and chert, which is seen in veins in the limestone. The limestone composing the hills on the eastern boundary of this plain is siliceous ; so much so, as to afford sparks with steel. It alternates in the same hill with a purple and yellowish shale, and a crystalline sandstone, which is generally found capping the summits. There are a few exceptions, however, where the limestone continues to the summit, the sandstone having been stripped off by denudation.

* The Mussulmans, from the supposed qualities of the stone in discovering poison, call it "*Pad-zahr,*" or Bezoar stone. By the Hindus on the spot, it is called "*Gurha Putsa Rai.*"

Veins of calcareous spar and quartz intersect both rocks; the former also occurs in filbert-sized nodules in the looser varieties of the sandstone. The strata dip at an angle of 10° from the granite towards the E. The direction of the sandstone ranges is S. 45° E. The surface of the limestone is grooved with furrows, which have a generally south-westerly direction. This surface is uneven, unlike the regular polished surfaces formed by glaciers.

Crossing the plain towards the granite, the fragments become more quartzy, and at the base of the nearest granite hill runs a belt of a pale reddish jaspideous rock in an E. 10° S. direction, penetrated by numerous quartz veins. Large beds of quartz occur also in the granite, and are often seen between this and Gooty to form entire hills. The limestone and sandstone terminate in a small hill on the left of the road, a little to the east of Yairypully, about nine miles E. from Gooty. The pebbles of the conglomerate have not been transported from any great distance; the angular ones appear to have once formed part of the jaspery and chert veins, which traverse the limestone; and the rounded pebbles have probably been carried by the stream from the adjacent hills. Their course may also account for the furrows just alluded to, on the surface of the limestone, on the summits of those hills which have not been capped by the conglomerate.

Gooty. The limestone and sandstone formation is now taken leave of. From the village of Yairypully, about nine miles east from Gooty, nothing but granitic trap and quartz rocks, associated with gneiss and hornblende schist, present themselves; the latter form several picturesque peaks to the left of the road. The rock of Gooty is a vast precipitous mass of a sienitic granite, composed principally of reddish felspar quartz, a little mica, hornblende, and actynolite. The actynolite occurs with felspar in thin veins of a lively green, or in drusy surface crystals. At its base, gneiss occurs with beds of a brilliant hornblede schist, dipping at an angle of 62° from the hill, *i. e.* to the west. This schistous bed forms the rising ground on which the Idgah stands: it is penetrated by quartz and granitic veins, which I was unable to trace to the main rock. It imbeds nests and drusy crystals of actynolite. Dykes of basaltic greenstone are numerous.

Height of Gooty plain and rock. The approximative height above the sea by the boiling point of water of the plain at the base of the Gooty

rock is 1200 feet; and that of the summit of the latter above the plain, about 900 feet. From the old flagstaff at the top is a fine view extending over a sea of hills to the East and Northward; and over the great *regur* plains of the Ceded Districts to the West. To the South the Gooty range is prolonged to the Cuddapah and Mysore frontiers.

A dark narrow cavern infested by bats is shown in the granite near the top of the rock, at the bottom of which is a well which the natives affirm, with little probability, communicates with the Paumri stream in the plain below. Gooty is said to have derived its origin from the Rishi Gotama's residence on the rock. The fort is naturally of great strength, and the favourite abode of the Mahratta chief, Morari Row.

Goontacul. Between this place and Gooty, from which it is about twenty miles West, granite, hypogene rocks and basaltic greenstone prevail; the latter is seen often in long low black ridges of blocks piled one upon the other like a huge wall of masonry, and penetrating the associated rocks. The blocks and masses seen in the plain North of the village of Guntacul are principally of the usual granite of India, composed of felspar, quartz, mica, and hornblende, and schorl but rarely: the crystals of felspar are large and well defined. This large grained granite is penetrated by veins of a smaller grained granite with reddish felspar, and a few plates only of mica; veins of compact opaque quartz coloured by actynolite, are often numerous. Schorl occurs in the blocks of granite seen scattered near the great tank of Rayelcherroo.

We now cross into the ancient Hindu kingdom of the Karnátak from that of Andhra. Both Telinghi and Canarese are spoken here and at Gooty; but a little farther Westward, Canarese prevails.

Guddacul. Overlooking the bungalow on a craggy hill, stands a small conspicuous pagoda to Chouri Amma. It is the easternmost of a broken range from the W. N. W. At its Northern base is a thick bedded gneiss, with dark coloured mica in scales. The upper part of the hill is occupied by masses of red sienitic granite with thin veins of quartz and felspar coloured by actynolite. The crystals of hornblende disintegrate into a rusty coloured powder, which leaves cavities on the surface of the rock in falling out.

The rock on which the small fort stands is also of sienitic granite, penetrated by a greenstone dyke. At its base is an excavation, about eight feet deep, into a greenstone bed or dyke.

It is in various stages of disintegration, which has been hastened and modified apparently by the infiltration of water containing carbonate of lime and muriate of soda. The dark hornblende crystals have been converted into the green hue of diallage, which passes into a greenish yellow and *feuille morte*, and other deeper shades of brown. It is reticulated with seams, filled and lined with kunker. I have seen this singular effect produced on the colour of hornblende under similar conditions, in various parts of Southern India. It is probable, that the green, or greenish yellow-coloured rock, if analysed by the chemist, would afford different results to those yielded by the hornblende rock prior to disintegration. Thus rocks and minerals often decay only to appear in other and often more beautiful combinations.

The sienitic granite here exhibits great variety in structure and colour, from close-grained to porphyritic: flesh-coloured felspar and light green actynolite occur in veins.

Bellary. The clusters of rocks on which the fort of Bellary stands, those overlooking the Ball-practice ground, and the Peacock hills in the vicinity are all composed of a crystalline granite containing hornblende in addition to the usual components. The greater proportion of the felspar in this granite is flesh coloured, and imparts a prevailing tinge to the rock. The granite occurs in all its varieties in one mountain mass, compact and porphyritic, red and grey, micaceous and hornblendic.

The Peacock hills, and the broad-backed rock on which the fort stands, are nearly covered with loose cubiform blocks and rounded masses of granite, which appear as if shot out suddenly on the ground from some enormous cart. Many rise suddenly from the flat plain, like inverted tea cups on the surface of a table. Such is the aspect of most granite masses of S. India.

Tors and logging stones abound in the Peacock hills and on the cluster near the Ball-practice ground, where occurs that singular pile figured in the XIIIth No. of the Journal Royal As. Soc. in the article on the quarrying granites of Egypt and India. Here also is seen, one of those curious piles of calcareous scoriæ, attributed by the Hindus to the Racshasas of old.*

* Vide No. XIII, Journal Royal As. Soc., p. 129, &c.

Garnetic gneiss and leptinitic gneiss occur around the bases of these granite rocks in contorted strata; and further to the S. and W., rise the hornblende and chlorite schists into the ranges of Boodihal and the Copper mountain.

Copper Mountain. This dome-shaped mountain is the highest point of a ridge which runs by Jondoor N. Westerly to the Tumbuddra near Hospett, and about five miles Westerly from Bellary. It is said to be 1500 feet above the plain at its base, which at Bellary is about 1600 feet above the sea according to General Cullen's measurements. The great plain at its Eastern base extends Easterly as far as Gooty, Northerly to the North bank of the Kistnah, and Southerly to the Mysore frontier: it is for the most part covered with a rich sheet of *regur*, resting either on kunker or the debris of the subjacent granitic and hypogene rocks; and in addition to the bajra, and other dry grains of red soils, smiles with extensive crops of cotton, wheat, and the white juari.

The inferior ridges at the base of the range are chiefly of gneiss, and a reddish and faint greenish quartz rock. The great mass of the ridge is composed of hornblende schist passing into chlorite and earthy ferruginous schists, capped by a wall-like naked ridge of a dark brown rock composed generally of a greyish chert, and brown iron ore, or jaspideous red and brown clay, in alternate layers, and resting apparently on their edges; in fact, a ribbon jasper on a large scale. The laminæ are often highly contorted and waving. The crest is often broken up by transverse fissures or joints; and, at more than one part of its crest-like course, has suffered manifest disturbance. Its general direction is S. Easterly.

A columnar mass, about 50 feet high, crowns the ridge, not far from the copper excavations, and serves as a guide-post to their site, which is nearly obliterated by earth and fragments of excavated rock, and can be hardly found without the aid of a *Tulari*, or of a person who has previously visited them. A crater-like cavity, on the top of a small mound a few yards in diameter and of little depth, was pointed out as one of the excavations for copper made by order of Hyder. I examined the sides and bottom of this cavity, but did not discover any vein of the ore in the rocks composing them, though traces of the green carbonate in their seams and incrustations are seen on the refuse thrown out. On the right

of the ridge a little farther to the N. W., is another excavation at the base of the rocky crest of the range.

The ore appears to have existed only in these thin incrustations and seams, (for I could not find the slightest trace of any continuous lode or vein,) and the project was shortly given up by Hyder. The imbedding rock is a ferruginous slate clay, and the ferruginous quartz rock of the crest.

From the vicinity of these excavations rises the dome-shaped summit before mentioned, as the loftiest peak of the ridge. Its summit is flat-convex, and capped with laterite containing much iron. This tubular mass is precipitous on its S. W. side, and contains two apparently natural caves situate at the bottom of the precipices, of small dimensions.

In one of these stood the shrine of the tutelary deity of the mountain; and recent offerings of flowers, oil, and cocoa had been made in this rude rock temple. On the roofs and sides of these caverns are partial incrustations of common salt and alum, which appear to have been deposited by water percolated through the porous mass above, and which contains sulphuret of iron, by the decomposition of which the sulphuric acid has been set free.

This peak formed one of the stations of the Trigonometrical survey: a pile of stones on its surface marks the stand probably of the flag. The thermometer in the shade during the hottest part of the day stood at 72° Farenheit only, (July.)

Descending the ridge N. of this peak, a large dyke of trap is seen crossing the mountain in a westerly direction. White potter's-earth, kunker, and smoky quartz occur in the vicinity. At the base, a small seam of whitish saccharine limestone (marble) is seen in the hornblende rock.

The singular ranges and valley of Sondur to the Westward of the Copper mountain, have been described already, (Madras Journal for Sept. 1838, p. 128).

Ringing stones of Courtney. A little to the S. E. of the village of Courtney, about ten miles W. N. W. from Bellary, to the left of the road is a low, long, black ridge composed of blocks of basaltic greenstone piled one upon another,—the outgoings, in fact, of a dyke which penetrates and projects from the surrounding granitoidal gneiss rocks.

Their piled and separated appearance is entirely owing to that natural process of spontaneous splitting, and concentric exfoliation when exposed to the atmosphere, which I have attempted to describe elsewhere.

These blocks, like phonolite and other rocks of basaltic origin, give out a metallic sound when struck by a stone or hammer : and here, from the peculiar and often delicately poised position of the blocks, the effect is greatly enhanced. A few years ago an ingenious person in London made a sort of harmonicon from slabs of basalt and other rocks. The course of this dyke is South-westerly.

Daroji. From Bellary to the great tank of Daroji, about fifteen miles, the plain is flanked to the westward by the Copper mountain range, which is gradually neared. Granite and gneiss are seen in low hills and masses along its western base. A spur of this range ends at the S. E. angle of the Daroji tank, throwing out a few outliers in the direction of its line, viz. N. W. by N. This natural barrier line of elevation prolonged by an artificial embankment, or "*bund,*" of stone and earth, nearly three miles long, dams up the water flowing down the sides of the ranges to the West, North-west, and South. It continues to the village of Daroji, beyond which is another outlier of the Copper mountain range.

One of the rocks in the line of the tank bund presents a vertical section of the strata, which do not materially differ from those forming the crest of the Copper mountain already described, and have a similar vertical arrrangement of laminæ. Traces of the green carbonate of copper also occur in it, and similar incrustations of the sulphate of alumina of an earthy texture, are found at the bottom of a quarry in a small hill crowned by a Hindu temple on the bund of the tank. Small seams in the rock are filled with this mineral. Laterite, associated with a blistery, and mammillary iron ore, occurs in a few small overlying patches.

A little to the North of this, beyond the village, lies a small hill of chloritic schist ; and on its flanks, a lofty and extensive outburst of granite forming a chain of naked rugged peaks separated by deep transverse gaps or valleys, stretching towards the South. It flanks the plain West of the tank, and diverging towards the W., is lost in the still loftier elevations of Sondur.

At its contact with the chloritic schist the granite loses its mica, becomes a pegmatite, and is seamed with vertical lines of cleavage. The felspar of the granite becomes more compact, and is of a pale pink colour. Its quartz often acquires a greenish blue tinge, probably from the contiguity of the chlorite, and its structure becomes prismatic. Dark dendritic markings occur on the superficies of the prism.

A few feet from the line of contact the mica reappears in the granite. Thin flakes of chlorite, however, are visible in its structure, which impart to it a somewhat laminar character. Actynolite also occurs in the veins of eurite, quartz, and felspar, with which these mountain masses of granite are intersected.

The chloritic schist has been hardened and often converted into jaspideous rock at the contact. The smooth surfaces and the prismatic fragments into which it splits, on being struck by the hammer, exhibit dark arborescent delineations on a pale greenish yellow ground curiously contrasted with the dull, greenish blue colour of the schist. Short veins from the granite are seen penetrating the chlorite schist; and it is evident that, at this point at least, as at the celebrated locality of Glen Tilt, the granite must have penetrated this hypogene rock in a liquid or semi-liquid state. Some of the seams in both rocks are lined or filled with calcareous incrustations.

Bijanugger. From Daroji to the celebrated ruins of Bijanugger (about fifteen miles) the route lies through low clusters of hills principally of granite and gneiss. The felspar of the granite is usually reddish, and it is often coloured by actynolite of lively shades of green.

From the low grounds between these hills, hornblende and chloritic schists are frequently seen out-cropping, and are the outgoing of numerous basaltic dykes, the general direction of which is Westerly and Northwesterly.

Angular and slightly worn fragments of a coarse variegated jasper, a ferruginous quartz and indurated clay, occur scattered on the surface of the valley along which the road lies, mingled with fragments of the other rocks in *situ*. It is probable these fragments of jasper have been derived from the Sondur ranges on the left or W. The range on the right, as Bijanugger is neared, assumes the more rugged and indented aspect peculiar to granite.

The whole of the extensive site occupied by the ruins of Bijanugger on the South bank of the Tumbuddra, and of its suburb Annagundi on the Northern bank, is occupied by great bare piles and bosses of granite and granitoidal gneiss separated by rocky defiles and narrow rugged vallies encumbered by precipitated masses of rock. Some of the larger flat bottomed vallies are irrigated by aqueducts from the river, and appear like so many verdant Oases in this Arabia Petræa of Southern India. Indeed some parts of the wilderness of Sinai reminded me, but on a far grander scale, of this huddled assemblage of bare granite rocks on the banks of the Tumbuddra. The formation is the same, the scantiness of vegetation, the arid aspect of the bare rocks, and the green spots marking the presence of springs, few and far between in the depths of the vallies, are features common to both localities.

The peaks, tors, and logging stones of Bijanugger and Annagund indent the horizon in picturesque confusion, and are scarcely to be distinguished from the more artificial ruins of the ancient Hindu metropolis of the Deccan, which are usually constructed with blocks quarried from their sides, and vie in grotesqueness of outline and massiveness of character with the alternate airiness and solidity exhibited by nature in the nicely poised logging stones and columnar piles, and in the walls of prodigious cuboidal blocks of granite which often crest and top her massive domes and ridges in natural Cyclopean masory.

The granite clusters of Bijanugger are continued on the opposite or Northern bank of the river to Annagundi and Gungawutti in the Nizam's territories. On the East they are bounded by the great *regur* plains of the Ceded Districts, and on the West by those of the S. Mahratta country. The country to the S. has already been described.

At first sight these elevations appear to have sprung up confusedly without order or arrangement; but I found, after ascending the loftiest summits, and after a careful examination of the direction of the laminæ in the gneiss, interstratified beds, veins, and fissures, on both sides of the river, that the great general line of dislocation nearly follows that hitherto observed, viz. N. N. W. and S. S. E. and that the rock opening through which the Tumbuddra flows is a cross valley.

A few caves, both natural and artificial, occur in the granite. The natural caverns are usually fissures roofed by precipitated blocks, or the

spaces left between great superimposed masses of rock, and not, as in limestone, laterite, &c., galleries, or caverns in the substance of the rock itself.

The rock temple to Rungasami is in a low, dark cavern, formed partly by a fissure, and partly by artificial means.

The marks of the chisel in the granite quarries whence was excavated the material for constructing the great monolith statues, the temples, palaces, walls and aqueducts of this once magnificent city, are as fresh as if only of yesterday. Those in the blocks quarried from Syene in upper Egypt are almost equally as recent looking; a phenomenon attributable in part, to the great dryness of the atmosphere.

About a mile easterly from Nimbapur, a small hamlet in the suburb of Bijanugger, lies an oval-shaped heap of calcareous scoria, about forty-five yards long by about eighteen broad, and from ten to fourteen feet high, partially covered by grass and other vegetation. It is evidently artificial, and of considerable antiquity. The Brahmins aver it to be the ashes of the bones of the Giant Walli, or Bali, an impious tyrant slain here by Rama on his expedition to Lanka (Ceylon*.)

After passing a week in these interesting ruins, engaged in having the inscriptions on stone copied, rambling among its deserted temples and collecting the marvellous legends of the few priests that now linger on the principal sacred spots, I proceeded along the western flank of the Sondur hills, on the right bank of the Tumbuddra, towards the ferry into the S. Mahratta country at Humpsagur. With regard to the inscriptions it may be remarked, *en passant*, that the greater part are in the old Canarese character, (but the language is often Sanscrit,) and chiefly dated in the 14th and 15th centuries. One of them is curious, as showing that the bridge over the Tumbuddra was constructed by the Hindu prince Ramnatha, prior to the Bayel Dynasty of Bijanugger; this is in Nagri character, on a stone at the foot of the mountain on which Hanuman is said to have been born, date A. S. 1211.

Hospett. Hospett lies about five miles W.S.W. from Bijanugger, near the point where the two ranges enclosing the valley of Sondur end, and

* For an account of these heaps of ashes, vide Journal Royal As. Soc. No. XIII. p. 129, &c.

nearly meet, being connected by a high and massive embankment of stone and mud. These ridges have already been described, *(Madras Journal of Literature and Science.)*

A dyke of basaltic greenstone crosses the plain between Bijanugger and Hospett in a westerly direction. It forms an eminence, on which is situated an ancient Mahomedan burial ground, a little to the W.N.W. of Camlapoor.

Granite blocks, with much red crystalline felspar, are seen in the ditch of the fort of Hospett.

Proceeding towards Humpsagur, the road lies along the stone embankment just mentioned. Gneiss is seen immediately at the eastern base of the hills, but their bulk is composed of a dull green hornblende schist, with much silex and argillaceous matter, crested by a jaspideous rock similar to that cresting the Copper mountain. This rock contains nests, and layers of iron ore and loadstone, or iron ore with polarity. This I first discovered in setting down my pocket compass on one of the ferruginous-looking masses which project from the surface of the mammiform hill overlooking Hospett, when I was surprised to see the north pole of the magnet whirl suddenly round to the south,—a hint to be careful in selecting spots for taking magnetic bearings, choosing a site for an observatory, or in selecting stones for the fixed stands of magnetic instruments, &c.

Quartz, both white and ferruginous, is abundant; and a white striated mineral resembling tremolite externally.

Wallavapur. This place is about thirty miles from Hospett. Below the fine *anicut* (dyke) thrown across the river by the Hindoo princes of Bijanugger, is seen a bed of gneiss penetrated by veins of porphyritic granite, containing much pink felspar in large semi-foliated crystals; and here and there nests of hornblende and mica. The strata of the gneiss are waved and bent.

A dyke of basaltic greenstone crosses the river bed in a westerly direction, compact at the edges: porphyritic towards the centre. The imbedded crystals are of light green felspar augite and hornblende.

Gneiss, granite, hornblende schist, and basaltic greenstone continue to Humpsagur, where the Tumbuddra is crossed, into the South Mahratta country.

Rock basins. The rocks in the bed of the river, both from Bijanugger and still farther east to Humpsagur, afford many instructive examples of the formation of rock basins by the action of water in motion, particularly below the *anicut* of Wallavapur, where the gneiss is full of them.* The *anicut* itself is a stone dam, about twenty yards broad, thrown across the river so as to dam up its course, and to throw part of its water into the fields on either bank. On stone slabs in both wings of this *anicut* are inscriptions in the Hala Canada character, giving the date of its construction, viz. 1443 Anno *Salivahana*, (about 1521 A. D.), name of Cyclar year, *Vicrama;* in the month *Aswin*. Although the floods of this large river have washed over these inscriptions for upwards of three centuries, the characters of the inscription are perfectly distinct and legible.

From Humpsagur to the Western Ghauts. From Humpsagur the river crossed into the Darwar, or South Mahratta country, the geology of which by Gudduk and Dammul to the Western Ghauts, has already been described as consisting of granite and the hypogene schists, intersected by greenstone dykes.

From Cuddapah to Darwar the *Régúr* prevails, interrupted only when the rising of these rocks from the surface has covered their bases with a more recent alluvium resulting from their own disintegration.

Ghauts West of Darwar. The formation of the Ghauts W. of Darwar is the same as at Gairsuppa, and their western base to the sea at Goa is partially covered, as at Honawer, by a bed of laterite. Most of the surface buildings and fortifications of Goa are constructed of this rock, and it formed the thick walls of the once tremendous dungeons of the Inquisition, now lying prostrate. The startled snake and glittering lizard glide noiselessly away, scared by the sound of man's footstep among the rank vegetation which in many places chokes up the ruins.

* For a description of the Rock basins of the Tumbuddra, vide Proceedings Geol. Soc. for 1841-42.

On the Invention of the Armenian Alphabet. *By* JOHANNES AVDALL, Esq. *M. A. S.*

If ancient Hellenic writers assign the palm to Cadmus for having been the inventor or introducer of the Greek letters, Haican historians of antiquity do bestow an equal distinction on St. Mesrop as the author or originator of the Armenian alphabet, the invention of which took place in the commencement of the fifth century, when this eminent divine flourished in Armenia, during the reign of Viramshapuh. Anterior to this period the Armenians used the Greek, Syriac and Persian characters. All their ecclesiastical and historical books were written in the two former, while the transactions of their courts of justice, as well as of their civil administration, were recorded in the latter.

Although it is true, as it will appear from what I shall have to state hereafter, that about a score of rude letters existed among the Armenians long before the day of St. Mesrop, yet their imperfection and consequent inutility was an insuperable bar to the cultivation of Armenian literature and to the advancement of knowledge among the sons of Haic. The disadvantage, attendant on the non-existence of a perfect and systematic alphabet, was deeply felt by the Armenian literati of that period. Lazarus Parphensis, a reputed historian of the fifth century, tells us that the books used in the national schools, were written in Syriac characters, and that the Armenian youths were, in consequence, subjected to great toil, perplexity and expense in the prosecution of their studies. The pious and the devout experienced similar difficulties in attending divine service, which was read and performed in books written in Greek or Syriac characters. This was certainly a source of great discouragement both to the pastors and the congregation, and at this the godly spirit of St. Mesrop was deeply grieved. The foregoing statement is fully borne out by the authority of Moses Chorenensis, who is justly termed the Armenian Thucydides, and is familiar to the learned of Europe by a Latin and French translation of his history of venerable antiquity. "Եւ ՚ի վարդապետել երանելոյն Մեսրովբայ, ոչ փոքր կրեր վտանգս, քանզի ինչն էր ընթերցօղ և թարգմանիչ. և եթէ այլոք չանդիպէր որ ընթեռնոյր՝ ուր նա ոչ լինէր՝ զանխուէ՚ի ժողովրդոցն լինէր յաղագս ոչ լինելոյ թարգմանիչ։" "Beatus autem Mesrobes non parvam molestiam

inter docendum ex eo cepit, quod ipse cum lector, tum interpres erat, neque a populo intelligi potuit, si quis fortè, eo absente, legisset, quoniam quidem non aderat interpres." *L. III. Cap.* XLVII. The heart of St. Mesrop burned with a holy desire to translate the Scriptures into the Armenian language, but the want of a perfect alphabet operated as a check to the attainment of the great object he had in view. This insurmountable obstacle tended, in no small degree, to the revival of paganism in some parts of Armenia, the inhabitants of which had embraced Christianity. The mind of St. Mesrop, was, therefore, literally absorbed in the plan of systematizing and completing the Armenian alphabet, fully sensible that on the success of this important project depended the civilization and happiness of his countrymen. Moses Chorenensis, referring to the object in view, adds: "Վասն որոյ եդ ՚ի մտի հնարել գտանել նշանագիրս Հայոց լեզուիս • և արկեալ զանձն ՚ի պէսպէս ջանս՝ պէսպէս փորձիւք տաժանէր։" "Atque ob eam rem rationem iniit, quemadmodum Armeniacæ linguæ characteres inveniret; qua in re dum operam poneret, variis premebatur difficultatibus." *L. III. Cap. XLVII.*

St. Mesrop was eminent for his profound learning, and his knowledge of the Greek and Syriac languages. His unrivalled qualifications had obtained for him the appointment of Secretary to the King Viramshapuh. Having filled this situation for a certain time, he preferred the quiet of monastic seclusion to the bustle of public life. Urgent business induced Viramshapuh to sojourn in Mesopotamia, where the absence of his able and experienced Secretary, or of one equally competent to discharge the duties of his office, was a serious impediment to the progress of the transactions of his court. The use of Persian characters in public writings presented many difficulties. Hereupon, a priest or monk, named Abel, offered to the king to introduce Armenian letters, the prototype of which was said to be in the possession of a Syrian bishop, known by the name of Daniel. These letters are mentioned in the annals of ancient Armenian writers by the designation of Danielian characters, which, however inelegant and incomplete, were destined to be improved, systematized and completed by the genius of St. Mesrop.

It is thus evident that Armenian letters were extant prior to the fourth century, but these, like the Hebrew and Arabic alphabets, were

without vowels, the want of which rendered the existing consonants of little avail or practical utility. Koreun, another cotemporary writer, says, that the Danielian characters were considered insufficient to link syllables together, and to form words out of them. Hence these characters were allowed to sink into disuse, and in their stead, the Greek, Syriac and Persian alphabets were used by the Armenians of those days.

The Danielian characters were twenty-two, or, according to other writers, tweny-nine in number. The invention of the seven vowels, Ա, Ե, Է, Ը, Ի, Ո, Ի is only ascribed by Asolik to St. Mesrop, while another historian asserts that he invented fourteen letters, of which seven were consonants, and the other seven, the foregoing vowels. Vardan, who flourished in the thirteenth century, says:—"St. Mesrop invented and introduced the Armenian alphabet, of which twenty-two letters are known by the designation of Danielian characters, which were, from time immemorial, extant among the Armenians. But these Danielian characters had become obsolete, in consequence of their being incomplete and insufficient to combine the syllables of words in the copious language of Haic. The Armenians were, therefore, obliged to content themselves with the use of the Greek, Syriac and Persian characters. St. Mesrop succeeded, by inspiration from above, in inventing fourteen letters, of which the form was seen inscribed on a stone by an invisible hand! This sacred gift he obtained on the mount Balu, as Moses had received the Divine tablets on the mount Sinai! To this day vestiges of the stone, bearing the miraculous inscription of the letters, are visible on that spot, which is held in veneration by the Armenians." That there were Armenian letters anterior to the Christian era, was ascertained beyond a doubt during the reign of the Armenian king Leo, when coins were discovered, bearing inscriptions commemorative of the sovereignty of pagan Armenian kings. But these letters were both inelegant and imperfect, and our modern Ezra, St. Mesrop, brought them to perfection.

The fact of the existence of Armenian letters, prior to the beginning of the fifth century, is further corroborated by the testimony of foreign writers. Philostratus, who flourished during the reign of the emperor Severus, and who enjoyed the patronage of the empress Julia,

thus writes in his history of Apollonius Tyanæus:—" A panther was once caught in Pamphylia, having round its neck a gold collar, on which were inscribed these words in Armenian characters, Արշակ թագաւոր՝ աստուածոյն Նիսեայ ։ *King Arsaces to the god Nysæus.*"

The improvement and perfection of the Armenian alphabet was immediately followed by the establishment of numerous elementary schools and colleges for the instruction of the sons of Haic in scholastic books written in their own characters. The Scriptures were also translated from the original Greek into Armenian, together with such select Greek works as were calculated to enlighten and elevate the minds of Armenian students. Thus a happy change was wrought, in the beginning of the fifth century, by the introduction of Armenian letters; and the reign of Viramshapuh, like the Augustan age, is considered as the golden era of the cultivation of Armenian literature.

The Armenian alphabet consists of thirty-eight letters, of which twenty-two existed, though in a rude form, prior to the Christian era; fourteen were invented by St. Mesrop, and two were borrowed from the Greeks in the twelfth century.

The following are their forms, names, and sounds.

Forms.			*Names.*	*Sounds.*
Ա	ա	ա	Ibe (as in *tribe*)	A (as in *father*)
Բ	բ	բ	Bien,	B soft.
Գ	գ	գ	Kim,	K. C. Q.
Դ	դ	դ	Tah,	T soft.
Ե	ե	ե	Yetch,	Ye (as in *yes.*)
Զ	զ	զ	Zah,	Z or S soft.
Է	է	է	E.	E (as in *met.*)
Ը	ը	ը	Yet,	U (as in *us.*)
Թ	թ	թ	Twoh,	T hard.
Ժ	ժ	ժ	J. or Zh,	J. French, or as English *S.* in the words *pleasure, measure.*
Ի	ի	ի	Inni,	I or E.
Լ	լ	լ	Luine,	L.
Խ	խ	խ	Khé,	Ch. German, or as χ Greek.
Ծ	ծ	ծ	Dzah,	Dz.

The following are their forms, names, and sounds, (continued.)

Forms.			*Names.*	*Sounds.*
Կ	կ	ձ	Ghien, ...	G hard.
Հ	հ	հ	Hwoh, ...	H.
Ձ	ձ	ձ	Tzah, ...	TZ soft.
Ղ	ղ	ղ	Ghahd, .. .	Gh or as γ Greek.
Ճ	ճ	ճ	Je or Jde, ..	I or G soft.
Մ	մ	մ	Mien, ...	M.
Յ	յ	յ	He or Ye, ..	H soft.
Ն	ն	ն	Noo, ...	N.
Շ	շ	շ	Shah, ...	Sh.
Ո	ո	ո	Wo, ...	Wo (as in *worthy.*)
Չ	չ	չ	Tchah, ...	Tch or Ch (as in *charity.*)
Պ	պ	պ	Pe, ...	P.
Ջ	ջ	ջ	Tche *or* Ché, ...	Ch or Tch soft.
Ռ	ռ	ռ	Rah, ...	R hard (as in *raft.*)
Ս	ս	ս	Sé, ...	S.
Վ	վ	վ	Viev, ...	V.
Տ	տ	տ	Tune, ...	T.
Ր	ր	ր	Ré, ...	R soft.
Ց	ց	ց	Tzvoh, ...	Tz hard.
Ւ	ւ	ւ	Une, ...	U.
Փ	փ	փ	Pure, ...	P.
Ք	ք	ք	Ké, ...	K or Ch (as in *archangel.*)
Օ	օ	օ	O, ...	O.
Ֆ	ֆ	ֆ	Pha, *or* Fé, ..	Ph or F.

It is worthy of notice, that a beautifully lithographed folio volume on Armenian Caligraphy was published at Venice in 1834. In this interesting publication is given a great variety of specimens of the Armenian alphabet, in nearly thirty different forms, which must certainly excite the wonder of orientalists, and the admiration of the lovers of Armenian literature. A similar publication has, it appears, lately issued from the Armenian press at Vienna, but not a single copy of it has as yet reached us in India.

The monthly meeting was held at the Society's Rooms on Tuesday evening, the 12th of August, at the usual hour, Charles Huffnagle, Esq. the senior member present, in the chair.

The proceedings for the month of June were read and confirmed by the meeting.

In reply to an enquiry from Capt. Marshall as to the causes of there having been no meeting in the month of July, the Secretary stated that his public duties having become, on a sudden, excessively onerous, owing to the necessary investigations connected with the extensive opium forgeries which had taken place, he had been unable to give any attention to the Society's affairs at that epoch, and thus the meeting was unavoidably postponed.

In reply to a further enquiry from Captain Marshall, as to alterations in the days of meeting, which in the rules was stated to be the first Wednesday in every month, some conversation took place, in the course of which it was satisfactorily shewn by the older members present, that from the nature of Indian, and especially of Calcutta Society, much discretionary power was necessarily, and always had been, left to the Presidents and Secretaries in calling the meetings; and further, that by the rule itself* it was evident this had been always intended; still it was thought by the meeting that it would be generally advantageous, if the former day (the first Wednesday of the month) was reverted to, with the understanding that it was the fixed day unless reasons of importance should necessitate any variation from it.

* *Rule* 9.—If any business should occur to require intermediate Meetings, they may be convened by the President, who may also, when necessary, appoint any other day of the week instead of Wednesday for the stated Meetings of the Society.

Read the following list of books presented and purchased:

List of Books received for the Meeting of the Asiatic Society, on Tuesday, the 12th August, 1845.

Presented.

Meteorological Register for May and June, 1845, from the Surveyor General's Office.
Oriental Christian Spectator for July, 1845.—By the Editor.
The Calcutta Christian Observer, for July and August, 1845.—By the Editor.
The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, No. 171, February 1845.—By the Editor.
Prinsep's Historical Results from Discoveries in Afghanistan, 2 copies.—By the Author.
Transactions of the Society of Arts, 1843-44, vol. LV.—By the Society.
Burnouf's Bhuddisme Indien, vol. 1.—By the Author.
The Sabda Calpa Druma, a Sanscrit Dictionary, by Rája Radhakant Deb. vol. 5.—By the Author.
Récherches Sur les Poissons Fossiles, par L. Agassiz :—1843, 17me et 18me livraisons.—By the Author.
Monographie des Poissons Fossiles du vieux grès rouge ou système Dévonien (old red sand-stone) Des iles Britanniques et de Russie, par L. Agassiz, 1er et 2d livraisons, 1844.—By the Author.
Baron Hügel's Travels in Kashmir and the Punjab, 1845.—By the Publishers.
Lithographed drawing of the evening ride of H. H. Maharaja Sheer Singh.—By Prince Soltikoff, presented by H. Torrens, Esq.

Purchased.

The Classical Museum, No. 1.
Ritter's Geographie, from the 2nd to the 9th vol.
Stuhr's Geschichte der Religions formen der heidnischen Volker. 2 vols.
Stuhr's Chinesische Reischreligion. 1 vol.
North British Review for August and November, 1844, Nos. 2 and 3.
Do. Do. Do. February and May, 1845, vols. 4 and 5.
Whewell's Philosophy of the Inductive Sciences, vols. 1 and 2.
Whewell's History of the Inductive Sciences, vols. 1, 2, and 3.
Reflections on the Politics, Intercourse and Trade of the ancient nations of Africa, by A. H. L. Heeren, vols. 1, 2, 3.
Donaldson's Varronionus.

Exchanged.

Journal of the Agricultural and Horticultural Society of India, Part II. vol. IV.
The Annals and Magazine of Natural History including Zoology, Botany and Geology, for May and June, 1845.
The Athenæum for April 26th, May 3rd, 10th, 17th, 24th, and 31st, and June 7th, and 14th.

Read a letter from the Secretary to the Board of Control transmitting bill of lading for the case of books presented to the Society by His Imperial Majesty The Emperor of Russia.

Read the following reply, by the Secretary, to the letter of His Excellency Count Ouvaroff, Minister of Public Instruction at St. Petersburgh.

The Minister of Public Instruction, St. Petersburgh.

I am honoured by being made the medium of communicating to your excellency the expression of the deep sense entertained by the President and Members of the Asiatic Society of Bengal of the gracious condescension of His Imperial Majesty the Emperor in viewing and deigning to direct the acknowledgment of their offering to His library in a manner so honourable and gratifying to them. The splendid medal of His Imperial Majesty will be regarded by the Society as among the most precious of the mementos which it possesses of great and distinguished men.

I am directed to forward a duplicate set of the works formerly dispatched for the Imperial library at Moscow, together with duplicate copies of two works in Arabic and Persian, published since the former dispatch.

The munificent gift of books vouchsafed by His Imperial Majesty will prove a most valuable addition to our stores of Eastern learning.

Allow me to record the expression of the pride which I must feel at finding myself the intermediate agent in so gratifying a correspondence as the present.

H. Torrens,
Vice Pres. and Sec. Asiatic Soc.

Read the following letter in reply to an offer made by the Society to furnish the Government of the North West Provinces with copies of the second map of the Nerbudda River, from Hoosungabad to Mundlaisir, by Colonel Ousely, now in the hands of the lithographers :—

No. 596.

From A. Shakespeare, Esq., *Assistant Secretary to the Government of the N. W. P.*
To Henry Torrens, Esq., *President and Secy. Asiatic Society, Calcutta. Dated Agra, the 17th July*, 1845.

Genl. Dept. N. W. P.

Sir,—I am directed to convey His Honor's thanks for the offer contained in your letter, of the 28th ultimo, and to state that he will be glad to receive 100 copies of the Map prepared by Colonel Ouseley, of the Nerbudda river, from Hoosungabad to Mundlaisir.

A. Shakespear,
Assistant Secy. to the Govt. N. W. P.

Agra, the 17th July, 1845.

Read the following letter :—

No. 811, of 1845.

From F. Cunnie, Esq., *Secretary to the Government of India,*
To the Secretary, Asiatic Society, Fort William, the 28th March, 1845.

Foreign Dept.

Sir,—I am directed by the Governor General in Council to transmit for such notice

as the Society may deem it deserving, the accompanying copy of a Journal of Lieutenant Rowlatt's Tour into the Mishmee Hills, North East of Sudiya.

J. Currie,
Secretary to the Government of India.

Fort William, the 28th March, 1845.

The paper was referred to the Editors of the Journal for publication.

Read the following letters and papers from the Society's London Agents :—

Duplicate, Original per "Duke of Cornwall."

London, April 21, 1845.

Henry Torrens, Esq., *V. P. and Secretary to the Asiatic Society, Calcutta.*

Sir,—We have the pleasure to enclose you a Bill of Lading for a case of books presented to the Asiatic Society by the Dutch Government, and which we have shipped to your address by the "Duke of Cornwall." The case was transferred from the Dutch vessel to the Duke of Cornwall without any charge being made for duty.—We beg to enclose you a memorandum of the expenses, which we shall place to the debit of our account with the Society.—We also enclose you a translation of the letter that was to accompany the Box.—The original is on very thick paper, and we shall take an opportunity of forwarding it in a parcel.

We shall be obliged by your favouring us with instructions regarding the disposal of the large stock of the Asiatic Researches received from Mr. Murray on the 5th March, 1844.—We wrote you respecting the same on the 29th February, 1844, since which time we have not sold a single volume.

W. H. Allen and Co.

Duplicate.

Asiatic Society, Calcutta.

April 19th, 1845.—Case of Books received from Rotterdam addressed Henry Torrens, Esq., Freight from Rotterdam, Warehousing, Entry, Export Bond, Dock Charges, and Lighterage, for transhipment ex "Batavia" to the "Duke of Cornwall," for Calcutta. Freight and Bills of Lading for the same, ... £3 5 0

W. H. Allen and Co.

Duplicate, Translation.

Hague, 27th January, 1845.

No. 770—*5th Division.*

Some time ago I received your letter of September, 1843, enclosing a copy (in your letter you speak of two copies, but I only received one), of different works in and relating to the Arabian, Thibet, and Sanscrit languages, published by or obtainable at the Asiatic Company of Bengal, which works have been placed by the said Company at the disposal of His Majesty the King of the Netherlands.

His Majesty heard with much pleasure that these works had been sent to him, and desired me to convey to the Society his best thanks, and at the same time to say that these works have been placed in the Library of the University at Leyden, where such works are deposited.

In compliance with your request to procure for the Asiatic Society the works published here by the Government relating to Scientific pursuits, I have the honor, by the authority of His Majesty, to send you the works which are mentioned in the accompanying list; of the first one we can only send as yet the Botanical part, which is quite completed. The two other parts treat of Zoology, Geography, and Statistics, which are already very far proceeded with, but will not be ready for some time, and shall then be sent to you.

Acquitting myself of His Majesty's commands, I have to request you to communicate them to the Asiatic Society of Bengal, and remain, &c. &c.

The Minister of the Interior.

The list referred to is as follows:—

Lyst van werken bestemd voor de Aziatische Maatschappy van Bengalen te Calcutta.

1. Verhandelingen over de Natuurlijke geschiedenis der Nederlandsche overzeesche Bezittingen. Vol. I. Kruidkunde.
2. Museum Anatomicum Academiae Lugduno Batavae, descriptum af Edwardo Sandefort, vols. 1, 2, 3 et 4.
3. H. A. Hamaker, Incerti auctoris liber de expugnatione Memphidis et Alexandriae.
4. A. Rutgers, Historia Yemanae Sub Hasano Pascha e codice M. S. Arabico edita.
5. H. E. Weyers, Prolegomena ad editionem duarum Ibn Zeidouni epistolarum.
6. H. E. Weyers Nieuwe Proeve om al de Arabische Letters, etc. door het gewoon Europeesch Karakter onderscheidenlyk uit te drukken.
7. P. T. Veth, Liber As-Sojutii de nominibus relativis.
8. P. T. Veth, pars reliqua ejusdem libri.
9. T. Roorda's Abul Abbasi Amedis Tulonidarum primi vita et res gestae.
10. M. Hoogoliet, Prolegomena ad editionem celebratissimi Ibn Abduni poematis in luctuosum Aphtasidarum interitum.
11. A. Meursinge, So-jutii liber de interpretibus korani.
12. T. J. P. Valeton Taálibii syntagma dictorum brevium et auctorum.

Duplicate; Original per "Wellesley."

London, June 14th, 1845.

Henry Torrens, Esq. *V. P. and Secretary to the Asiatic Society of Bengal.*

Sir,—We have the pleasure to enclose you a Bill of Lading for a case to your address shipped by the "Wellesley," Captain Toller, containing a bust of B. H. Hodgson, Esq. which has been executed by Mr. Thornicroft. The Bust is considered a very fine specimen, and we trust it will give satisfaction to the members of the Society.

Mr. Thornicroft is the son-in-law of the celebrated Francis,* and is much patronized by Her Majesty and Prince Albert.

The case has been packed with the greatest care and we have had it stowed in a secure place on board the Wellesley. We would recommend your applying for it immediately on the arrival of the vessel at Calcutta.

* So in original. Query: Chantrey?—Eds.

We beg to enclose an account of the cost of the Bust, and have given credit for £51 17*s.* 9*d.* as per our letter of the 2nd July, 1844, and also for £9 19*s.* 2*d.* agreeably to your letter of the 5th of October, 1844. The balance of £34 8*s.* 11*d.* can be remitted to us should you desire it kept separately from our account for the sale of the publications of the Society, which will be rendered to you by an early mail.

We are, Sir,
Your faithful servants,
W. H. Allen and Co.

H. Torrens, Esq. *Secretary of the Asiatic Society, Calcutta.*

1845, June 7th.—Paid for a Marble Bust of B. H. Hodgson,.....	£	84	0 0
,, ,, Case for packing, lined with tin and packing, ..		1	5 0
Entry, Wharfage, Shipping Expenses, and Bills of Lading,..		0	12 0
Freight and Primage, £1 2*s.* 6*d.*, Insurance on £90 at 40*s.* per cent. and Policy, £1 18*s.*		3	0 6
		88	17 6
Commission, 5 per cent.		4	8 10
	£	93	6 4
Cr.			
July 2nd, 1844.—By Balance of our account to June 30th, 1844, stated this date, ...		51	17 9
,, Amount of sale of Journal Asiatic Society of Bengal to No. 132 carried here as per request in the letter from H. Torrens, Esq. dated October 5th, 1844,.....		9	19 2
		61	16 11
Less paid a set of Bills drawn by you in favor of Mr. A. Bartlett,	2 19 6	58	17 5
	£	34	8 11

W. H. Allen and Co.

With reference to Messrs. Allen and Co.'s wish to receive directions as to the Volumes of Transactions received from Mr. Murray, it was resolved that the Secretary be empowered to order back such number of copies of each volume as he might judge best. It was further resolved that the Society's agents be desired to give to the Researches the advantage of advertising them at proper intervals.

Read a note from Dr. Strong claiming exemption from further payment of subscription, on the ground of his having been a member for more than twenty years.

After some consideration it was settled that as no authentic record of any such resolution appeared, Dr. Strong be requested to produce some authority and ground for his claim.

Read the following note from the Sub-Secretary with the letter and lists to which it refers :—

The Sub-Secretary has the honor to report that in reference to Mr. König's application and the list prepared by Dr. Roer (Proceedings of May 1845) of Sanscrit works published in Calcutta, he has, with the concurrence of the Secretary, addressed letters to various learned Hindus in Calcutta, with copies of the list, requesting them to supply any deficiencies in it. The whole having been returned with the suggestions of those gentlemen, the list is now further completed ; and may, he suggests, with the addition of those works sent by the Committee of Public Education be properly printed in the Journal. He submits herewith the letter of the Committee.

Henry Tonnens, Esq., *Secretary and V. P. Asiatic Society.*

Sir,—In reply to your letter dated 26th July, 1845, I am directed by the Council of Education to place at your disposal, for the purpose mentioned, the accompanying copies of the Sanscrit works indicated in your list.

The Council have no stock on hand of such books, as they have all been made over to the Library of the Sanscrit College, from which a larger number than those now sent cannot be spared. It may, therefore, perhaps, be worth the while of Mr. König to reprint such of them, as may be deemed deserving of and calculated to promote his very laudable and useful design. I am directed likewise by the Council to assure the Society that it will at all times afford them much pleasure to aid the Society in the promotion and extension of Oriental literature in every way in their power.

I have the honor to be,

Sir,

Your most obedient servant,

Fred. J. Mouat, M. D.,

Council of Education, Aug. 9th, 1845. *Secretary.*

List of Sanscrit Works, by Dr. Roer, L. A. S. and various learned Hindus ; to be forwarded to Mr. König, Bookseller of Bonn.

1. Ashtabings'hati Tatwa, 2 vols.
2. Shánkhya prabachana bháshya, 1 vol.
3. Amarakósha, 1 vol.
4. Abhignásakuntalanátuka, 2 vols.
5. Chhandamanjaribrittaratnâvali, 2 vols.
6. Sapnadhyáya, 1 vol.
7. Rájátarangini, 1 vol.
8. Abidhán, 1 vol.
9. Hitópadésa, 1 vol.
8. Sabda kalpalatika, 1 vol.
9. Nirnayasindhu, 1 vol.
10. Vivádachintámani, 1 vol.
11. Bijganita, 1 vol.
12. Kshétratatwadípika, 1 vol.
13. Satîka srimadbhágabat, 1 vol.
14. Satîkamanu, 1 vol.

15. Saṭíka bhagabadgíta, 1 vol.
16. Saṭíka prabódhachandródayanátaka, 1 vol.
17. Rudrachandi, 1 vol.
18. Panchapakhi, 1 vol.
19. Atrisanhita, 1 vol.
20. Vishnusanhita.
21. Haritasanhita.
22. Yajnavalkasanhita, 1 vol.
23. Angirasanhita, 1 vol.
24. Likhitasanhita, 1 vol.
25. Vyásasanhita, 1 vol.
26. Paras'arasanhita, 1 vol.
27. Kátyáyansanhita, 1 vol.
28. Vrihaspatisanhita, 1 vol.
29. Samwartasanhita, 1 vol.
30. Yamasanhita, 1 vol.
31. Ushnasanhita, 1 vol.
32. S'ankasanhita, 1 vol.
33. Apastambhasanhita, 1 vol.
34. Kámrupayátrapadhati, 1 vol.
35. Vyabastháratnávali, 1 vol.
36. Sudrakrityabichára, 1 vol.
37. Yajurvédivrishótsarga, 1 vol.
38. Daksasanhita, 1 vol.
39. Maṭhapratishthátatwa, 1 vol.
40. Purushótamatatwa, 1 vol.
41. Chandagyvrishótsarga, 1 vol.
42. Dibyatatwa, 1 vol.
43. Vástutatwa.
44. Vyavahártatwa.
45. Udbahatatwa.
46. Vritatatwa.
47. Práyaschitatatwa.
48. Yajurbédis'radhatatwa.
49. Jótishtatwa.
50. Ekádas'itatwa.
51. Srádhatatwa.
52. Débatápratishthátatwa.
53. Anhiktatwa.
54. Dáyatatwa.
55. Sanskáratatwa.
56. Tithitatwa.
57. Malamas'hatatwa. 57* Gítagóbinda. 57† S'rimonmahánáṭaka.

Sanscrit Books, forwarded by the Council of Education.

58. Bháshaparichhéda and Siddhánta Muktávali, 2 copies.
59. Laghu Káumudi, 1 vol.

60. Mugdhabódha, 1 vol.
61. Manusanhitá, 2 vols.
62. Mrichchhakati, 1 vol.
63. Mitákshara, 1 vol.
64. Bhatti Kávya, 2 vols.
65. Mudra Rákshasa.
66. Nyáya Sutra Vritti.
67. Sáhitya Darpana.
68. Védánta Sára.
69. Dáya Bhága.
70. Vyavahára Tatwa
71. Dáya Krama Sangraha, } 1 vol.
72. Kávya Prakás'a.
73. Málati Mádhava.
74. Vikramarvasi.
75. Uttra Ráma Charitra.
76. Ratnávali.
77. Raghuvansa.

57a. Christa-Sangíttá. Second Edition.
57b. Parbatíyópadésá.
57c, Mataparíksa.
57d. Nútnódantódótsa.

The Secretary presented also on the part of Dr. Sprenger, Principal of the Delhi College, lists of the works and translations published by the Vernacular Education Society, which were ordered to be printed and are as follows:—

فہرست اُن اُردو کتابونکي جو ورنیکیولر ایجوکیشن سوسئٹي نے چھپوائي ہیں

جو کتابیں چھپ چکي ہیں

تاریخ ہندوستان ..... ے
تاریخ انگلستان ..... للہ
تاریخ بنگال ..... عص
تاریخ ایران ..... ے
سیرالاسلام ..... ے
ے۸

خلاصه التواريخ مارشمن جلد ۱ و ۲ ..... ۴۴

كليات قوانين ديواني ۴۴

دهرم شاستر ۴۴ ۸-

شرع شريف ۴۴ ۸-

قانون فوجداري محمدي ۴۴

سراجي ۴۴ ۸-

اصول قوانين ۴۴

اصول قانون مال ۴۴

اصول گورنمنٹ ۴۴

اصول قوانين ممالك مختلفه ۴۴

خلاصه قوانين فوجداري ۴۴

خلاصه قوانين ديواني ۴۴

بولي ٹيكل اكونمي ۴۴

شمسيه ۴۴ ۸-

اصول علم طبيعي ۴۴ ۸-

اصول علم طبيعي آرنوٹ صاحب كي ۴۴ ۸-

علم مساحت كا رساله ۴۴ ۸-

علم مثلث ۴۴

حساب جزيات وكليات ۴۴

اقلیدس ۸ مقاله ..... ے

جبر و مقابله ..... للعہ

شاهنامه ..... للعہ

لیلیٰ مجنوں ..... عص

منتخب دواوین ..... ے

گلستان ..... عص

الف لیله ..... ے

قواعد اُردو ..... ے ۸-

چشمه فیض ۸/

حدایق البلاغت ..... عص ۸/

کتابیں جو چھپتي هیں

گریمر انگریزي - ویلنڈ صاحبکي پولي ٹیکل اکونومي - توزک تیموري - اصطلاحات اُردو - مختصر قدوري - تاریخ هندوستان تیمور سے شاه عالم تک - قانون مال - تاریخ بري و بحري - پي لي صاحبکا رساله وجود صانع حقیقي کے اثبات میں رساله آلات علم ریاضي کا دیول صاحب کا - علم ادات - هرشل صاحبکا هئیت - رایل صاحب کا نباتات - رساله درباب حفظ صحت کے - فلوجیا - منرو لوجیا - سنسکرت ٹانگ - علم جغرافیه - سرتا - حال پرنسپ صاحب هندوستان میں سنه ۱۸۱۳ ع سے ۱۸۲۳ تک - قزلباش - تاریخ رنجیت سنگه - ٹري مارکن صاحب کے اوصول علم حساب - علم

تشریح - انتخاب فارسي - علاوہ اُنکے بہتیري اور بھي کتابیں منظور
ہوئي ہیں اور اُمید ہی کہ تھوڑے عرصہ میں ترجمہ ہوجائینگي

List of Urdoo Translations published by the Vernacular Education Society.

History of India,	Rs.	6	0 0
Ditto of England,		4	0 0
Ditto of Bengal,		1	0 0
Ditto of Persia,		3	0 0
Ditto of Mahomedanism,		3	8 0
Marshman's Brief Survey of History, Parts 1st and 2nd,		5	0 0
Marshman's Civil Regulations,		15	0 0
Hindoo Law,		1	8 0
Mahomedan Law,		1	8 0
Mahomedan Criminal Law,		1	0 0
Mahomedan Law of Inheritance,		1	8 0
Principles of Legislation,		5	0 0
Ditto of Public Revenue,		4	0 0
Ditto of Government,		2	0 0
Ditto of the Law of Nations,		5	0 0
Assistant Magistrate's Guide,		5	0 0
Prinsep's Abstract of Civil Law,		7	0 0
Political Economy,		2	0 0
Logic or Shumseea,		1	8 0
Introduction to Natural Philosophy,		2	8 0
Arnott's Physics,		5	8 0
Principles of Practical Geometry,		1	8 0
Trigonometry, Conic Sections, &c.		4	0 0
Differential and Integral Calculus,		7	0 0
Euclid, (8 Books,)		3	0 0
Algebra, (compilation by Ramchund,)		4	0 0
Shahnama,		4	0 0
Leila Mujnoo,		1	0 0
Selections from the most celebrated Hindoostance Poets,		3	0 0
Goolistan,		2	0 0
Alif Leila,		6	0 0
Urdoo Grammar, by Moulvee Imambux,		3	8 0
Ditto ditto, by Ahmud Ally,		0	8 0
Hudayakool Balaghut, (a Treatise on Rhetoric,)		1	8 0

Books in the Press.

Grammar of the English language for Madrasshas.
Wayland's Political Economy.
Toozuk Timooree.
Urdoo Exercises.

Mookhteser Koodooree.
History of India, (from Timoor to Shah Alum.)
Revenue Regulations.
Maritime and Inland Discoveries.
Paley's Natural Theology.
Simson's Mathematical Instruments.

Books under Translation.

Whewell's Mechanics.
Herschell's Astronomy.
Royle on the productive resources of India.
A Treatise on preservation of Health.
Ditto ditto on Physiology.
Mineralogy, (from the Arabic.)
Geology, (from Ditto.)
Sanscrit Dramas.
General Geography.
Susruta on Medicine.
Principal Transactions in India, from 1813 to 1823.
The Kuzzil Bash.
Life of Runjeet Sing.
DeMorgan's Arithmetic.
Druitt's Vademecum of Surgery.
Persian Reader with Urdoo notes and vocabulary.
Several other books have been accepted and will shortly be translated.

Read the following letter from Lieutenant C. B. Young, Bengal Engineers, accompanying the drawing to which it refers :—

To H. Torrens, Esq. *Secretary to the Asiatic Society.*

My dear Sir,—I have the pleasure to send you the drawing of the brass statue of the Hindoo deity Goorur-jee at Joscemuth. A late traveller in the Himalaya has supposed it to be of Grecian construction and representing the God Mercury. The former from its excellent workmanship may not be improbable, but it has wings neither to the head dress nor feet, nor has it a caduceus of any kind in the hands, which are joined as in the act of prayer. It corresponds with the representation of Garuda or Gurura given in Coleman's Hindu Mythology, having the wings and the hooked nose, and in addition the zennaar and ornamental parts of various kinds, as the tiara, halo, jewelled earrings, necklaces, bracelets, armlets, and anklets. The whole construction as you will see from the drawing (which is as faithfully copied in every respect as possible and without any flattery) is very far superior to the generality of Hindoo workmanship, and the whole form and expression of the statue are graceful, elegant and tasteful.

The statue is in the town of Joscemuth at the junction of the Vishnoo Gunga and Doolee rivers, and the residence of the Rawul of Buddreenath, but it does not seem to be much valued either from its sanctity or workmanship, as though the Rawul's residence

is close at hand it is left without protection of any kind, in the open air on the top of a rough structure of stones, among a few old half ruined temples.* I did not measure its height, but it is about two feet. The general colour somewhat darker than I have made it, more weather stained and like bronze. The pedestal is cast and hollow. The left wing has been broken off and replaced crooked. The clasps of the sacred thread and of the necklace and anklets are made of the cobra's head. The whites of the eyes are silvered over. At the back of the circular halo are two iron brackets apparently for supporting a staff of some kind. In conclusion of the above, which I hope you will not think too prolix for so slight a subject, and regretting that I am not able to give you more learned particulars, I would merely add that the natives only say of it, that it has been there a very long time and originally fell from heaven.

I remain, your's faithfully,

C. B. Young, *Lieut.*

Almorah, July 18th, 1845. *Engineers.*

P. S.—There is no writing or inscription of any kind on it.

The Secretary further stated that he had received from Major Leech, C. B. five portions of the Manuscript to the map of the Kuruk-khetra promised by that gentleman, (Proceedings June, 1845,) and that he proposed to publish it together with the map with a translation in opposite pages of the Journal.

After some conversation it was resolved that the Manuscript be referred to Dr. Hæberlin for examination and report, &c.

Read extract of a letter from Col. Ousely, Agent to the Governor General South West Frontier, to the Sub-Secretary, relative to the memoir which accompanied it, and which had been sent to the printers to appear with the map, in an early forthcoming number of the Journal.

I have the pleasure to send a memorandum, relative to the survey and map made of the Nerbudda under my superintendence, by a clever Mahratta, Ramchunder Mahadoo, of which a part was published with Mr. Shakespeare's note on the Navigation of that river, in No. 151, 1844, of the Journal.

Chota Nagpore, Aug. 2, 1845

Read letter from Raja Radhakant Deb :—

To the Secretary of the Asiatic Society, Bengal.

Dear Sir,—I have the pleasure to send you the 5th Volume of the Sábda Calpa Druma, and hope you will do me the favor to place it with the preceding four volumes in your Society's Library.

Your's faithfully,

4th July, 1845. Radhakant.

* The public road to Buddreenath passing along side it.

Read a note from Capt. Latter as follows:—

My dear Sir,—I beg to send for presentation to the Society a portion of a very interesting Boodhist sculpture, I will in a short time forward a paper illustrating it.

Your's sincerely,

Thos. Latter.

Read notes from Major Wroughton and Col. Stacy to the Sub-Secretary:—

My dear Piddington,—I received the accompanying note from my friend Colonel Stacy. I send the marble Sculpture at the same time, and if you will be good enough to do with it as Colonel Stacy advises you will much oblige me. You can keep Colonel Stacy's note as a voucher that his wishes on the present occasion have been complied with.

Ballygunj, July 25th, 1845. Robt. Wroughton.

My dear Wroughton,—Let me request you to send the White Marble Sculpture to Mr. Piddington, Assistant Secretary, Asiatic Society, begging that after the Society have satisfied themselves of its beauties, it may be placed with the rest of my property there.

The Mosque of which it formed a part is at Kella Beese, 14 marches nearly west of Kandahar. I sent down a collector for coins, and he brought me, on a subsequent trip, three camel loads of stone sculptures, one of which is the present subject, most ancient Togra Arabic with Grecian Band.

Your's sincerely,

Futtyghur, 17th July, 1845. J. Stacy.

Also the following note by the Sub-Secretary, the sculpture to which it relates being in the room:—

Supposed Buddhist sculpture from Muttra, and a stone with an Arabic Inscription, presented through Captain P. T. Cautley, by Colonel Stacy.

Read the following extract of letter from Walter Elliot, Esq. M. C. S. to the Sub-Secretary, acknowledging plans, papers, and a number of the Journal relative to the language and antiquities of Dipaldinna and Amrawatty, which have been forwarded him on the part of the Society in aid of his proposed researches in that interesting part of India:—

To H. Piddington, Esq.

My dear Sir,—Allow me to return you my best thanks for the kindness with which the Society has attended to my request made through Mr. Torrens for copies of the Dipaldinny plans, and for the trouble you have further taken to send the rest of the information bearing on the subject, which must have cost you some pains and time to search out, and

for which therefore I feel the more grateful. All your communications have been safely received, the four parts of the MS. copy of Colonel McKenzie's memoirs in the Asiatic Journal, the Number of your Society's Journal with the Amrawatty Inscriptions and Alphabet, and lastly a few days ago the tin case with the plans. I am now fully armed for a campaign against the Buddhist remains at Dipaldinny and I hope in a few days to be able to go there. If I find any thing interesting I will let you know. This district is rich in Inscriptions, and I have already collected enough to afford a tolerable outline of its history from the 5th century. The successive predominance of different dynasties is very distinctly marked by the periods within which the grants made by them occur, while occasional interregna are filled up by the short-lived importance of petty local chiefs, who strutted their hour upon the stage in the plumes of royalty, bestowing lands and cows and villages with all the formality of imperial phraseology. I have been disappointed with the very meagre list of the Gujpati Kings of Orissa in Prinsep's Tables. Stirling says the lists at Juggernath are full and complete and yet he did not give them. Prinsep seems merely to have taken what he found in Stirling, and I find many names here not included in the table. The Tables in Part II. are well worth re-publishing with the additional information obtained since they were first compiled. I have got very ample materials for lists of the southern dynasties, but I defer making use of them in hopes of getting more. Many others have done the same and the whole of their labors have been lost—witness Ellis and McKenzie; I often find myself going over the same ground that they have done. Wilson sent me out three MS. folios of the catalogues only of McKenzie's Inscriptions, but the Inscriptions themselves are I suppose in the India House, where they are quite useless. Pray make my best acknowledgments to Mr. Torrens and say how much I feel obliged to him and believe me, my dear Sir,

Guntoor, June 27th, 1845. Walter Elliot.

Read the following extract from a letter from Lieut. A. Cunningham, R. E., accompanying the paper to which it refers :—

To H. Piddington, Esq.

My dear Sir,—Herewith I have the pleasure to send for publication in the Journal of the Asiatic Society of Bengal, a notice of some very interesting and unpublished coins of the Indo-Scythians. I send one plate of the coins with the article, that you may be able to lay your hands upon the 600 copies of the plate which I sent down three years ago.

A. Cunningham,
Gawlior, 12th June, 1845. *Lieut. Engineers.*

The Presiding Member, Charles Huffnagle, Esq., exhibited to the Society the curious piece of sheet copper forming the subject of the following memorandum, on which was clearly to be read the words *two foot* in chalk coloured by a thin oxidation of copper, but having distinctly preserved the copper below it from further wear, as stated in the note :—

I have it in my power to exhibit a very interesting fact to the Society this evening. Through the kindness of Captain Kelloch, of the steam ship Bentinck, I now shew you piece of sheet copper taken from the steamer "Hindoostan." This copper was placed upon the ship in England, and since it was there fastened the ship has passed over about 100,000 miles. You will perceive that *a chalk mark* made upon the copper still remains! and the portion of copper under this chalk mark is of *the original thickness*, while the friction, &c., has worn away every other part of its surface. Since this interesting discovery the owners of the ship Æneas have chalked over the whole of her copper with the hope of thus preserving it.

Read the following extract of a letter from Dr. H. Walker, Surgeon to the Right Hon'ble the Governor General.

My dear Mr. Torrens,—I have the pleasure to send you a list of books on Zoology, &c., required for the Library of the Asiatic Society. A large proportion of these works, however, treat of science in general.

On a rough calculation, I think the cost ought not to exceed 10,000 rupees.

Many of the books are of antient date. These, the society's bookseller, should seek out in the catalogues of second-hand books, such as Bohn's, &c.

Some works I have not inserted on account of the expense, such as, Vieillot and Le Valliant's Birds of Africa—also Spix and Martius's Zoology of Brazil. The list comprises complete sets of the Transactions of the principal learned Societies of Europe and America—those of the French Institute—of the Royal Academy of Sciences of Berlin—of the Academies of St. Petersburgh, Stockholm, Copenhagen, &c. It also comprises the Natural History of the voyages which have been undertaken from time to time by the Governments of Europe and America.

If you can obtain the sanction of the Society for the purchase of these books you will do more for the good of the Institution and for the promotion of science than has been done for a long time before in this country.

Barrackpore, 11th August, 1845.

The Secretary stated that he proposed to lay before the Society a financial statement; when the means of gradually compassing this important purchase could be discussed.

In reference to this subject the Sub-secretary stated that in vol. V. of the Society's Journal, p. 190, there was a letter printed from M. Guizot, then Minister of Public Instruction in France, formally presenting to the Society a copy of M. Jacquemont's work printed by the French Government, of which the Society had only received a few numbers. The Secretary was authorised to apply in form for the remaining ones.

The Secretary stated that he had to present a valuable paper on Revenue matters from James Alexander, Esq., C. S. which he proposed to print in an early number of the Journal.

The Secretary presented on the part of the Rev. M. Barbe, Missionary, a paper on the hill tribes in the interior of Chittagong, which he proposed to print at an early date.

Report of the Curator Geological and Mineralogical Department, and Museum of Economic Geology for the months of June and July.

Geological and Mineralogical.

We have to announce here a valuable series of eight papers on the Geology of Southern India by our indefatigable contributor Captain Newbold.

And these papers are the more valuable as they describe sections across the whole Peninsula. I need not refer Geologists and scientific men in general to this gentleman's papers already published in our Journal, that of the Royal Asiatic Society, and Madras Literary Society, to give them an idea of the value of this contribution. We are preparing the lithographic diagrams, and the papers will appear in regular succession in the Journal.

Lieut. Sherwill has also sent us a note, with two capital sketches of some very singular sandstone concretions near Sasseram, of which I have the pleasure to exhibit the lithographs, which however, though the artist's drawing was good, have become somewhat confused in the printing and by no means do justice to Lieut. Sherwill's capital pen and ink sketches.

In pursuance of the suggestion made in my report, and approved by the Society, the following letter has been addressed by our Secretary to the Private Secretary to the Right Hon'ble the Governor General. It could not be sent in before, the map having the been returned to Lieut. Sherwill to mark the heights, &c.

The Private Secretary to the Right Hon'ble the Governor General.

Sir,—I am desired by the Asiatic Society to request that you will be pleased to bring specially to the notice of the Right Hon'ble the Governor General the highly meritorious exertions of Lieut. W. S. Sherwill, 66th B. N. I. of the Revenue Survey; that gentleman having, in the intervals snatched from the very laborious duties of a Survey officer, constructed a beautiful Geological map of the province of Behar and made a valuable collection of 375 large specimens to illustrate it, together with a memoir, all of which he has placed at the disposal of the Asiatic Society, which is farther indebted to him for other communications and presentations, of minor but still of very considerable importance.

The Society believe that there is scarcely any instance yet on record of a public officer adding so zealously and largely to his public duties, and so usefully advancing our scientific knowledge of the district in which he is employed, and have thus they conceive a pleasing duty to fulfil in respectfully bringing it to the notice of the Right Honorable the Governor General. Lieut. Sherwill's Geological map accompanies the present for the inspection of the Right Honorable the Governor General, after which I have to request its return.

Museum, 26th July, 1845. H. Torrens,
V. P. and Secretary, Asiatic Society.

And the following reply has been received :—

H. Torrens, Esq. *Secretary, Asiatic Society.*

Sir,—I am directed by the Governor General to acknowledge the receipt of your

letter forwarding a map constructed by Lieut. Sherwill, 66th B. N. I. which has been laid before his Excellency.

I am at the same time desired to state that the Governor General considers the map to be admirably executed, and that Lieutenant Sherwill deserves great credit for devoting his leisure hours to scientific pursuits, and for presenting to the Asiatic Society the result of his exertions.

I beg to return Lieut. Sherwill's map, and to remain,

C. S. Handinge,

July 30th, 1845. *P. S.*

On application to government we have been kindly favoured with a set of the Revenue Survey maps of the Lower Provinces as far as completed, being in all, as per accompanying list, 131 sheets. The constant references which we have to make for localities render these maps together with those of the North West Provinces formerly obtained, of much value to us.

Museum of Economic Geology.

We have had referred to us a specimen of (Assam ?) Lignite by Messrs. Mackey, the examination of which is worth putting on record, as adding one more to those tabulated by Mr. James Prinsep, it is as follows :—

Report on a specimen of Lignite (sent as coal) for examination to the Museum of Economic Geology.

This specimen is not coal but lignite, i. e. wood reduced to carbon, and often impregnated with other matters, as iron, silex, &c. The locality whence obtained is not mentioned and I may note here that it always should be so. The clay and sand-stone sent with it resemble those of Assam.

Its specific gravity is..... 1·34

It contains in 100 parts.

Water, ...	12·00
Carbon,.....	31·60
Volatile matter, ...	26·40
Ash, ...	29·20
	99·20
Loss,.....	80
	100.0

It is thus a poor ferruginous, silicified lignite, the ash being principally iron and silex, but it may, in common with many of the lignites, be a very good fuel for many purposes as where heat only or carbonaceous matter (as in smelting metals) be required, but where flame, as for steam engines is also desired it would probably be insufficient. Nothing, however, can be said on this head but from a large and proper furnace trial. It might in some cases be profitable to mix with good coal.

The lignites are in some countries of Europe used as manures both pure and burnt.

H. Piddington,

Cur. Mus. Eco. Geology.

We are indebted to Major Glover, of the Madras Engineers, for three boxes of specimens ; his note of them is as follows :—

My dear Sir,—I have the pleasure to send you three small cases of specimens; that marked 6 is from the summit of the Sulloh mountain in Java, and the limestone therein are from the Bird's-nest caves on the Bhyt Binning estate, about seven miles from Buitenzorg. No. 15 contains specimens gathered on the Masulipatam level between that station and Vizagapatam, and No. 21 is from the vicinity of Tennivilly (Purla) in the Tanjong agency. I should have called myself, but I am too much pressed for time as the ship sails this evening.

J. C. Glover.

July 23rd, 1845. *Major, Madras Engineers.*

And though without any further references, (which is much to be regretted,) they are still valuable and will offer a good selection. I may mention that in the Indian specimens I have found a fine ore of Manganese, of which, though the locality is not named, it may be discovered, and if near to Vizagapatam or Masulipatam, be worth exporting.

Dr. Roer has obliged us with a small specimen of the stone of which the noted pagodas of Tribenee, zillah Hooghly, are built. It is a dark basalt with abundant crystals of olivine, and so nearly resembles the stone cannon-balls from the Tellhaghurry pass presented to the museum about two years ago by Mr. Gatfield, that we might suppose them to be from the same bed or dyke; and this is not impossible since the balls might well have been made at Hooghly under the Mogul Government and even from the materials of a Hindoo Pagoda.

Major Ouseley has forwarded to us a specimen of an ore, with the matrix, which was brought to him as the copper ore of the "Tamba Pahar" (copper mountain), near Suraykela, and also a bit of copper said to be made from it. This ore, however, is not copper but good magnetic iron ore; and this is the second instance in which iron ores (in the former instance a poor ferruginous silicate sent about four years ago) have been sent from that quarter as copper. I learn that the native chiefs threaten the direst punishments to those of their followers who shew the Europeans the mines, as they fear their being taken possession of by Government, as I believe is always the case under native rule. And if they really possess copper mines they no doubt derive some revenue from them.

Captain Shortrede has handed in a few small specimens of iron ores collected on his road between Jubbulpore and the banks of the Sone. They are mostly Hematites of a very fine grain and quality, and he states that they are very abundant.

We have received from Professor Zipser of Neusohl in Hungary, the following very gratifying letter which Dr. Roer has kindly translated for us:—

To the Honourable Asiatic Society of Bengal.

"The Aushurg Universal Gazette having published a Circular from the direction of the Honourable Asiatic Society with regard to the establishment of a Museum of Economic Geology, the undersigned, in furtherance of this object, has much pleasure in offering gratis to the Society his oryeto-geognostic collections of minerals of Hungary and Transylvania.

"We are, is said in that Circular, in almost entire ignorance about India and its resources, as well as about the causes, by which the progress of that country in several branches of industry, as, in mines, agriculture, &c. is so much retarded. To develope its resources, we must be assisted by every information not only respecting India, but also

Europe and America. Deprived of such information, our progress cannot be but small; on the contrary, armed with it, we may confidently hope, that the day will arrive, when the mines, quarries and the soil of India will bring to light the treasures nature has confided to them. We therefore trust, that those who are disposed *to contribute to this great public undertaking*, will bear in mind, that nothing, however common it may be deemed at its native place, *is unimportant* to us, and that no detail can be too minute, and no collection too large."

This explanation gives me the assurance to believe, that my gift will answer your expectations. I must, however, request you to direct me about the way of transmission. My collections, which contain only instructive specimens, together with an explanatory catalogue, will in parcels of a hundred be dispatched, according to opportunity and stock in hand. As I am in communication with Bremen, the collections might perhaps be forwarded to you from that place. Hoping you will soon favor me with an answer, I have the honour to be, &c.

Dr. C. A. Zipser, *Professor.*

Bergstadt Neusohl in Hungary, 21*st Feb.* 1845.

I should suggest that in replying to it we should be authorized on our side to offer to Professor Zipser assistance from all the resourses of the Society whether scientific or literary.

H. Piddington.

For all the above communications and presentations the best thanks of the Society were awarded.